A VAR ANALYSIS ON RELATIONSHIP OF INTERNATIONAL TRADE, FDI AND ECONOMIC GROWTH IN CHINA

By

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ABSTRACT

The role of foreign direct investment (FDI) and exports continues to be debated and tested in the literature on international economics and development economies. This paper extends the previous empirical studies on the issue by providing some evidence from time-series data period over 1980-2010 of People's Republic of China. In this study, the dependent variables were economic growth. The model tested using unit root test, Granger causality, Vector Autoregressive (VAR) and Impulse Response Function (IRF) to analysis that dynamic relationship between economic growth, FDI, export and import. In terms of causality the result shows economic growth will provide a positive influence on the level of FDI, that is, economic growth (GDP) granger causes on Foreign Direct Investment (FDI), and there is a mutual influence between export and import because of intra-trade and imports of intermediate goods. The Vector Autoregressive (VAR) and Impulse Response Function (IRF) approach is to investigate the response of the system to economic shocks; the results showed that, the country's economic growth is influenced by its lagged values of GDP. Finally this paper draws some policy implications for the further studies to focus on the economic growth in China, to ensure that economic growth would not be drop.

ABSTRAK

Peranan pelaburan langsung asing (FDI) dan eksport terus dibahaskan dan dipersoalkan dalam konteks ekonomi antarabangsa dan pembangunan. Penyelidikan ini meliputi kajian empirikal terdahulu dengan menyediakan beberapa bukti data dari tempoh masa sepanjang tahun 1980-2010 di Republik Rakyat Cina. Dalam kajian ini, pembolehubah bersandar adalah pertumbuhan ekonomi. Model yang diuji menggunakan "unit root test", "Granger casuality", "Vector Autoregressive (VAR)" dan "Impulse Response Function (IRF)" untuk menganalisa hubungan dinamik antara pertumbuhan ekonomi, FDI, eksport dan import. Dari segi sebab-musabab hasilnya menunjukkan pertumbuhan ekonomi akan memberikan pengaruh positif terhadap FDI iaitu pertumbuhan ekonomi (GDP) Granger penyebab kepada FDI, dan terdapat pengaruh di antara eksport dan import disebabkan oleh perdagangan dan import barangan pengantara. Pendekatan VAR dan IRF adalah untuk mengkaji tindakbalas sistem terhadap kejutan ekonomi dan keputusan menunjukkan bahawa pertumbuhan ekonomi negara adalah dipengaruhi oleh nilai-nilai yang tertinggal daripada GDP. Akhir sekali, kertas ini menarik beberapa dasar polisi untuk kajian lanjut terhadap pertumbuhan ekonomi di Cina disamping memastikan pertumbuhan ekonomi tidak akan menurun.

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TABLE OF CONTENTS

Pages

PERMISSION TO USE ..... **i**

ABSTRACT ..... **iii**

ABSTRAK ..... **iv**

ACKNOWLEDGEMENTS ..... **v**

TABLE OF CONTENTS ..... **vi**

LIST OF TABLES ..... **ix**

LIST OF FIGURES ..... **x**

ABBREAVIATIONS ..... **xi**

CHAPTER ONE **1**

INTRODUCTION **1**

1.1 Background 1

1.2 Problem Statement 4

1.3 Objective of the Study 6

1.4 Significant of the Study 7

1.5 Scope of the Study 8

1.6 Structure of the Study 9

CHAPTER TWO **10**

China's Economic Growth, International Trade and FDI **10**

2.1 Introduction 10

2.2 International Trade, FDI and Economic Growth in China 11

2.2.1 Trade policy and economic development in China 12

2.2.2 International Trade in China 14

2.2.3 Foreign Direct Investment in China 18

2.3 Conclusion 23

CHAPTER THREE 24

Literature Review 24

3.1 Introduction 24

3.2 The neo-classical theory of growth 24

3.2.1 The Solow model 25

3.2.2 Solow model with technology 28

3.2.3 Growth models with human capital 30

3.3 Empirical Studies on Exports, FDI and Economic Growth 32

3.4 Conclusion 36

CHAPTER FOUR 37

Data and Methodology 37

4.1 Introduction 37

4.2 Sources of Data 37

4.3 Model Specification and Techniques of data Analysis 38

4.3.1 Unit Root Tests 39

4.3.2 Cointegration Test 40

4.3.3 Error Correction Model 42

4.3.4 Vector Autoregressive Models (VAR) 44

4.4 Conclusion 46

CHAPTER FIVE 47

Result and Analysis 47

5.1 Introduction 47

5.2 Results of Unit Root Tests 47

5.3 Granger Causality test 49

5.4 Vector Autoregressive (VAR) and Impulse Response Function (IRF) Analysis 51

5.5 Conclusion 56

CHAPTER SIX 57

Conclusion and Policy Implication 57

6.1 Conclusion 57

6.2 Policy Implications 58

6.3 Recommendation for Future Research 59

REFERENCES 61

APPENDIX 65

LIST OF TABLES

Table 2.1	China in the World Economy	12
Table 2.2	World inward FDI 1970-2011	19
Table 2.3	The utilization of foreign capital in China between 1979 and 2010	20
Table 5.1	Unit Root Test	48
Table 5.2	Result of Granger Causality	50
Table 5.3	Vector Autoregression Estimates (VAR)	52
Table 5.4	Response of GDP to one S.D. shocks in GDP, FDI1, Export2 & Import2	55

LIST OF FIGURES

Figure 2.1	Composition of Chinese Exports and Imports by year 2010	15
Figure 2.2	China's Major Exports Destinations	16
Figure 2.3	Growths in Trade	17
Figure 2.4	The total amount of foreign capital utilizated between 1979 and 2010	21
Figure 3.1	Steady state in the Solow model	27
Figure 5.1	Result of Impluse Response Function	54

ABBREAVIATIONS

WTO	World Trade Organization
SEZs	Special Economic Zones
GDP	Gross Domestic Product
FDI	Foreign Direct Investment
MOC	Ministry Of Commerce
ELG	Export Led Growth
PPP	Purchasing Power Parity
IMF	International Monetary Fund
ADF	Augmented Dickey Fuller
ECM	Error Correction Model
VAR	Vector autoregressive
IRF	Impulse Response Function
FCI	Foreign Capital Inflow

CHAPTER ONE

INTRODUCTION

1.1 Background

Trade openness plays an importance role in economic growth in many countries. International trade in the nineteenth century and early twentieth century, generally encouraged the growth of the development countries of today, and it often been referred to as the "engine of growth". The growth of domestic demand, rapid expansion of trade, particularly in the export sector, led to the creation of large-scale industry to provide a further stimulus.

Openness in trade refers to the degrees to which countries or economies permit or have trade with other countries or economies. The trading activities include export and import, foreign direct investment (FDI), borrowing and lending, and repatriation of funds abroad. Open economies generally have greater market opportunities, at the same time they also face greater competition from foreign businesses. In terms of financial development international trade enables a channel to obtain funds from other countries, and also invest its surplus funds in other countries.

International and domestic trade across Chinese provinces appears to be high and rising even as China has become more integrated with the global economy (Young, 2000; Poncet, 2003). China's rapid GDP growth in recent decades has been impressive, averaging 10.3% per year from 1978 to 2010. Since 1978, the adoption of "reform and opening" policy initiated by Deng

Xiaoping who is the leader of the People's Republic of China, the economic growth of China increasing significantly. Economy dominated by large corporations and profitable state-owned enterprises, but private enterprises also plays an important role in the economy.

China has generally implemented reforms in stages. For its role in world trade has increased, and increased interest in international economics quickly. China's growth comes from domestic investment in large-scale infrastructure and heavy industry and the exports, whose role in the economy seems to have much exaggerated. This decision has been taken by the Government of the People's Republic of China to allow to be used by multinational companies of China as major economic competitors to other export-led economies countries in Asia, such as South Korea, Singapore and Malaysia.

The government also has focused on foreign trade as a major vehicle for economic growth. Contribute to economic restructuring and the resulting efficiency of more than ten-fold increase in GDP since 1978. China increased integration with the international economy and the growing efforts to use market forces to control the internal distribution of goods. Over the years, large subsidies were built into the price structure, and this has grown dramatically in the late 1970s and the 1980s and later. From the early 1990's and started the subsidy would be eliminated, mostly due to the entry into the World Trade Organization (WTO) in 2001 by economic liberalization. The absorbed structural change of rising income and liberalization, with the pace forced by the expansion of trade and investment in China, helped the current era of rapid growth in developing Asia to become healthy developing country.

Trade liberalization and strong output and import growth in China have helped country to maintain its commitment to growth-oriented policies. Sustained, rapid economic growth has

allowed China economies to catch up with advanced industrial economies more quickly. The continued rapid growth and structural change increases incomes and real exchange rates. The most dramatic change in China, now growing faster than any of its neighbors in their periods of strong growth.

An export-oriented strategy is considered to be a better choice as giving incentives can be applied across the board and easier than enforcing controls measure. It can rise up nation's income. There are many countries that promote exports and at the same time protect other sector. Export promotion and import substitution strategies might well be complementary. The latter might be a necessary step for export-led growth. (Hamilton and Thompson, 1994).

China's export base has become diversified from an initial heavy reliance on textiles and other light manufacturing. These products largely consisted of footwear, clothing, toys, and other miscellaneous manufactured articles, in recent years China has made substantial gains in other export categories, including more sophisticated electronics and industrial supplies. An import substitution strategy can be say trade barriers, due to penetration of foreign consumer goods, it will leads to market competition. China focusing on import advanced technology and equipment. While an export-oriented industry benefits both the domestic and export market, it is also easier to monitor the relative effectiveness of export promotion policies.

In the past one decade, foreign direct investment (FDI) in China has been one of the great successes. Through openness of trade and FDI, China can quickly absorb and digest the advanced technology in the world, so as to realize the upgrade of technology, innovation and breakthrough. Given the significant inflows, FDI together with Chinese domestic investment and other factors of production has promoted per capita income growth across the Chinese regions.

In addition, the rapid economic growth in the coastal areas has often been associated with the introducing of large amounts of foreign investment. In this process, FDI may affect the increasing the regional average incomes. One of the important indicators of China's integration with the world economy is the simultaneous expansion of FDI and international trade.

Degree of technical complexity of China's export products are continuously raising. In other words, China's technological progress cannot be separated with an open environment. To enhance export and actively expand imports, essentially is to continue to increase the degree of China's international trade. Also improving on FDI is very important in the next round of economic growth in China.

1.2 Problem Statement

Economic development is one of the main objectives of every country in the world and economic growth is fundamental to economic development. In recent years, trade openness or trade liberalization is rapidly becoming one of the current trends in the world especially in developing country. The economic growth model proposed that it is possible to establish a relationship between international trade, FDI and economic growth. From the previous empirical studies, it is claimed that, outward-oriented countries have greater growth rates compare to the inward-oriented economies. There is also concern about the trade, especially between the primary and industrial good exporting countries.

The relationships of international trade on economic growth are ambiguous. Although most of the empirical works support the export-led economic growth hypothesis, there is no overall

consensus on this issue. While some economists (Krueger, 1978; Chenery, 1979; Kavoussi, 1984; Ram, 1985; Fosu, 1990; and Salvatore and Hatcher, 1991;) generally agree that exports benefit economic growth, others (Jung and Marshal, referred as JM, 1985; Kwan and Cotsomitis, 1990; Ahmad and Kwan, 1991; Yaghmaian, 1994; and Ahmad and Harnhirum, referred as AH, 1995) did not find much support to the export led economic growth hypothesis. Researches of Michaely (1977), Kohli and Singh (1989) found that there is a critical level of export on economic growth.

In China, studies such as Liu Xuewu (2000), Shen Kunrong (2003) believe export is conducive to China's economic growth. But Shen Chengxiang (1999), Zhao Ling (2001) think that the promotion of export for China's economy is not significant or exists in a short period, not obvious in the long term. Yang Quanfa (1998), Bao Qun (2008) found the non-linear relationship between international trade and economic growth.

Many empirical researchers have been conducted their study on the basis of cross-section data, since there are some differences between economic structures of many countries, the results of each country would be different. According to Ram (1987), using cross-sectional analysis, even if the sample of countries obtained seems homogenous, but it is difficult to show the important parametric differences among the countries.

The export-led growth strategy suffers from a fallacy of composition as not all developing economies can pursue it simultaneously (Felipe, 2003). Thus, it is an issue as to know whether the rate of growth of exports affect the economic growth in China while using time-series data. As previous studies have pointed out, it is important to study the effects of exports. If it is found that promotion of export does have a positive effect on economic growth, the government may

accelerate the value of exports and expand international trade. Since, this study used the latest data over the time period from 1980-2010, the final results may help to improve our studies.

1.3 Objective of the Study

The issues on the impact of international trade as discussed in the previous section need further investigation, particularly on a single country perspective and different economic situation. Thus the main objective of this study is to examine the dynamic relationship of international trade and economic growth in China based on time-series data for the period of 1980-2010, in which this period include 2007-2010 global recession. The related objectives to the study are:

i) To test whether there is any evidence of causality between export and economic growth hypothesis in China

ii) To examine Granger causality among exports, import and foreign direct investment (FDI) on economic growth in China using time series data over the period from 1980-2010

iii) To establish the importance of each of these independent variables, which are exports, imports and FDI in influencing Chinese economic growth

1.4 Significant of the Study

Does export play a helpful role in the process of economic growth? This question has become passionate debates amongst economists and policy maker in civil society. It has gained importance in recent years, and this question has economic relevancy of the current conjuncture, because it goes to the heart of the process of development role that international trade plays in it. It also has enduring policy relevance as developing countries try to decide whether to open themselves up more to the process of globalization. This study is to investigate the importance of exports, imports and FDI on economic growth in one framework. This would answer the question whether these variables have effects on economic growth over time in China or not. International trade often seen as catalysts for economic growth.

In general, this study will contribute to the existing body of economic literature and development economics in particular in number of ways. First, it will survey and make distinction between major views on the relationship between exports, foreign direct investment and economic growth. Second, many empirical studies are based on cross-sectional data covering different groups of countries, Sometimes the critics of those study are ignore the difference between the parametric variation. If use single country, the difference should be less than the cross-country analysis and I may get more significant results. Third, a studying of the Chinese experience is useful, from the experience of China, the analysis provides some policy implications for the other former developing countries which shared the similar economic system as China, but now experiencing slower economic growth. Analysis of the relationship between international trade and economic growth from China may raise an effort to help these countries to develop their international trade and economic policy. Finally, the result of this study would

be potentially useful for government policy maker as a guide in implementing an appropriate policy, concerning international trade, FDI, in order to stimulate and sustain china's economic growth.

This paper focuses on the relationships of international trade on economic growth using the time-series data over the period from 1980-2010 for China. A study of the China's experience is useful, because it can provide some policy implications for developing countries, and may show how exports affect economic growth in a large country.

Most of the previous empirical studies are based on cross-country growth regressions, which are at least useful in identifying those factors that most consistently appear to be important determinants the economic growth. However, cross-country studies only highlight what appears to be important in general or on average; analytical country studies are needed to understand the process, and which factors were most important in individual countries (Rodrik, 2003). Also the limitation of the cross-country approach is that it is not usually informative for a particular country, difficult to derive country-specific policy implications (Durlauf, 2002). This is an important limitation since policies or factors that are appropriate in a particular country might be inappropriate in another country (Kenny & Williams, 2001).

1.5 Scope of the Study

This study is focuses on the relationship between international trade and economic growth in China, which covers the time period from the year 1980 to 2010. The model specification of this

study is based on the general production function, where economic growth is a function of domestic demand, FDI, exports and import in order to examine the effects of trade on economic performance.

1.6 Structure of the Study

This study is organized as follow. The following chapter provides an overview on the importance of the international trade and FDI on economic growth in the past decade. Chapter III reviews the theoretical framework and provides previous empirical studies on economic gross, exports, imports and FDI, and gives conclusion with these studies. Then, the econometric models and methodology that to be utilized in this paper are described in chapter IV. This chapter also provides detailed information estimation techniques and the data collection procedure. Chapter V presents the empirical results of the analysis and interpretation of the results. Finally, chapter VI provides the conclusion and discussion of this study on the direction of further research. Policy implications will also concluded in this chapter.

CHAPTER TWO

China's Economic Growth, International Trade and FDI

2.1 Introduction

The miracle of China can be mainly attributed to the reform and opening up process. After Deng Xiaoping addressed the opening up strategy in 1978, it has made important contribution to economic development in the world and the country is still in an important development period. According to Deng, to develop and construct a nation must open up. He pointed out that "one of the important steps of the reform and opening up process is to speed up the opening of the coastal areas, so that the vast areas with a population of 200 million can develop first, and drive the development of the inland. When the coastal areas are developed to a certain degree, they are to give more support to the inland areas as well." China's approach to economic reform has been gradual and incremental, this approach is still applicable to many of the reforms being carried out by China today. Mainly, China's integration into the global trading system is likely to benefit both the global and regional economies.

Special Economic Zones (SEZs) are contained geographic regions within countries, adopting liberal laws and economic policies to encourage foreign-invested manufacturing and services for export (See Shah, 2008). They are widely used around the world as part of a country's overall economic development strategy. In 2008, there were approximately 3000 Special Economic Zones in 135 countries, accounting for over 68 million direct jobs and over $500 billion of direct trade-related value added within the zones (World Bank, 2008).

After China entered the WTO on December 2011, it had increased Chinese opening up and economic process. The most immediate benefit from WTO accession for China was it increased the overseas market access. Over time, easier access to foreign market is likely to boost China's international trade.

2.2 International Trade, FDI and Economic Growth in China

International trade and foreign direct investment (FDI) have frequently been seen as catalysts facilitating economic growth and integration of transition countries with the world economy. International trade may indeed play a direct role in encouraging export growth, and in China performance was closely associated with trade promotions, and liberalization scheme, both regional and national. The relationship between exports and economic growth is strong in developing economies. The underlying theoretical model of Feder (1982) is used with the data of the Chinese provinces, and it is shown that the economic structure, degree of openness and policy environmental have a significant role in the relationship between exports, and economic growth. Coastal regions in China have shown a larger improvement in exports, and export processing zones have led to both the growth in exports and the growth in domestic output at an unprecedented rate in these regions of China. China has adopted a variety of measures to promote its foreign economic relations, maximizing the role of exports, imports and foreign capital in economic development. Foreign trade organizations were reorganized, and control of exports and imports was relaxed or strengthened depending on the balance of trade and the level of foreign exchange reserves. Terms of international trade play an important role in enhancing Chinese economy.

2.2.1 Trade policy and economic development in China

China has become as a major trading nation and foreign trade since economic reform began in 1978, it also begun to exert a greater influence on the domestic economy than at any other period in China's history. Its enhanced role in the world economy is evident both in China's participation in international economic organizations and its volume and pattern of trade. China's rapid growth has contributed to an increase in its share in world GDP from 2 percent (PPP basis) in 1980 to nearly 12 percent in 2008. And, with respect to world trade, in 1980 China accounted for just 1 percent of world trade flows, while by 2008 it increased for over 8 percent (Table 2.1).

Table 2.1 China in the World Economy

	1980	1990	2000	2002	2007	2008
China's share in world GDP						
At market exchange rates	2.6	1.7	3.8	4.4	6.2	7.3
At purchasing power parity	2.0	3.6	7.2	8.1	10.8	11.5
China's role in world trade						
Share in world trade	1.0	1.7	3.7	4.8	7.7	8.2
Trade with China as share of world GDP 1/	0.3	0.5	1.5	1.9	4.0	4.4
China's share in developing Asia's GDP						
At market exchange rates	40.4	35.1	51.8	54.9	57.6	60.8
At purchasing power parity	27.8	35.5	47.5	49.7	53.8	54.5
China's role in developing Asia's trade						
Share in developing Asia trade	2.0	2.1	4.1	5.8	11.3	12.1
Trade with China as share of developing Asia GDP 1/	5.3	6.5	7.2	7.8	8.5	9.1

Sources: IMF Direction of Trade Statistics and World Economic Outlook.

Over the same years China's trade volume expanded dramatically. In 1978, on the eve of reform, China was the world's thirty-second ranked exporting country. By 1989 it was the world's thirteenth largest trading nation. In the process its share of world trade almost doubled. Equally significant as the increased importance of China's trade in the world economy is the greatly heightened influence of international trade on China's domestic economy.

Economists have long argued that the shift away from a closed to a more open economy should improve the efficiency of resources allocation in developing economies and contribute to more rapid growth. This has been borne out by empirical studies showing trade liberalizations tends to lead to an increases of economic growth, particularly in economies where severe prereform trade restrictions were countered with strong liberalization measure(Michaely, Papageorgiou, and Choksi, 1991). What is sometimes overlooked is that the gains from international trade are likely to be limited unless domestic economic policies are liberalized. This linkage would appear to be even more important for a reforming socialist economy. In 1992, Deng Xiaoping called upon the nation to grasp the opportunity to deepen the reform and opening up process. Since then China has been actively involved in the process of globalization. With the growing of power and improving of its international position, China has become increasingly influential and has drawn attention worldwide. There is no doubt that China will ultimately become one pole of the world market, which is conducive to the establishment of the new world economic order and the modern world system.

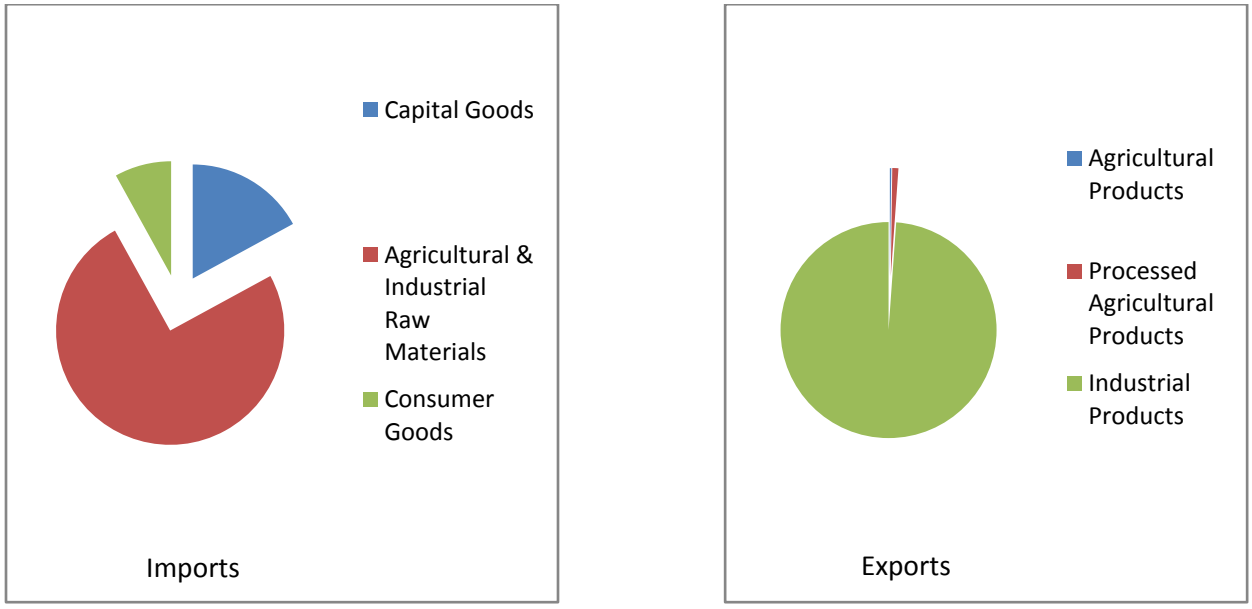
2.2.2 International Trade in China

The traditional international trade system was entirely unsuited to the opening of the Chinese economy to the outside world and the new development strategy that began to emerge in the late 1970s. The vice-premier Deng Xiaoping proposed a major transformation of China's foreign trade and investment policies. Deng believed increasing the industrial development would require the selective import of advanced technologies from abroad. This strategy had reached implications for Chinese strategies for both exports and for international finance. Since 1979, the monopoly of the specialized foreign trade companies was terminated, and each functional ministry set up its own foreign trade firms. In addition, the State Council gave the green light to Guangdong and Fujian to adopt special foreign trade policies for foreign trade affairs within the provinces. In 1987, the central government decided to establish Hainan as a province and built it into the largest SEZ of China. Then all foreign trade entities started to adopt the contract responsibility system and assume sole responsibility for profits and losses. The foreign trade contract responsibility system was rolled out nationwide with the government of all provinces, autonomous region, and foreign trade firms establishing contracts with the state on three items (the foreign exchange revenue from export, cost of currency exchange, and profit/loss). The reform led foreign trade firms to a healthy trajectory with consistent policy, equal competition, self-responsibility for profits and losses, a combination of industry and trade, and the agency system (Tang and Ma 2008). Ever since the accession to the WTO in 2001, China has been improving and complying with various laws and regulations on foreign trade, and deepening the reform of the state-owned foreign trade enterprises.

Export performance by developing countries is highly diverse. Its patterns differ significantly by country and region; over time, they are changing at different rates and in different directions. The process of globalization is increasing rather than reducing the ability of developing countries to integrate successfully with the world economy.

China's integration with the world economy is reflected in its rapidly growing role in international trade. China's exports and imports have grown very fast for more than 10 years. As China's trade with the global trade has deepened, the composition and geographical pattern of its trade have also shifted. The share of imports by industrial economics accounted for by China has increased and exports to these markets have become more diversified. (Figure 2. 1)

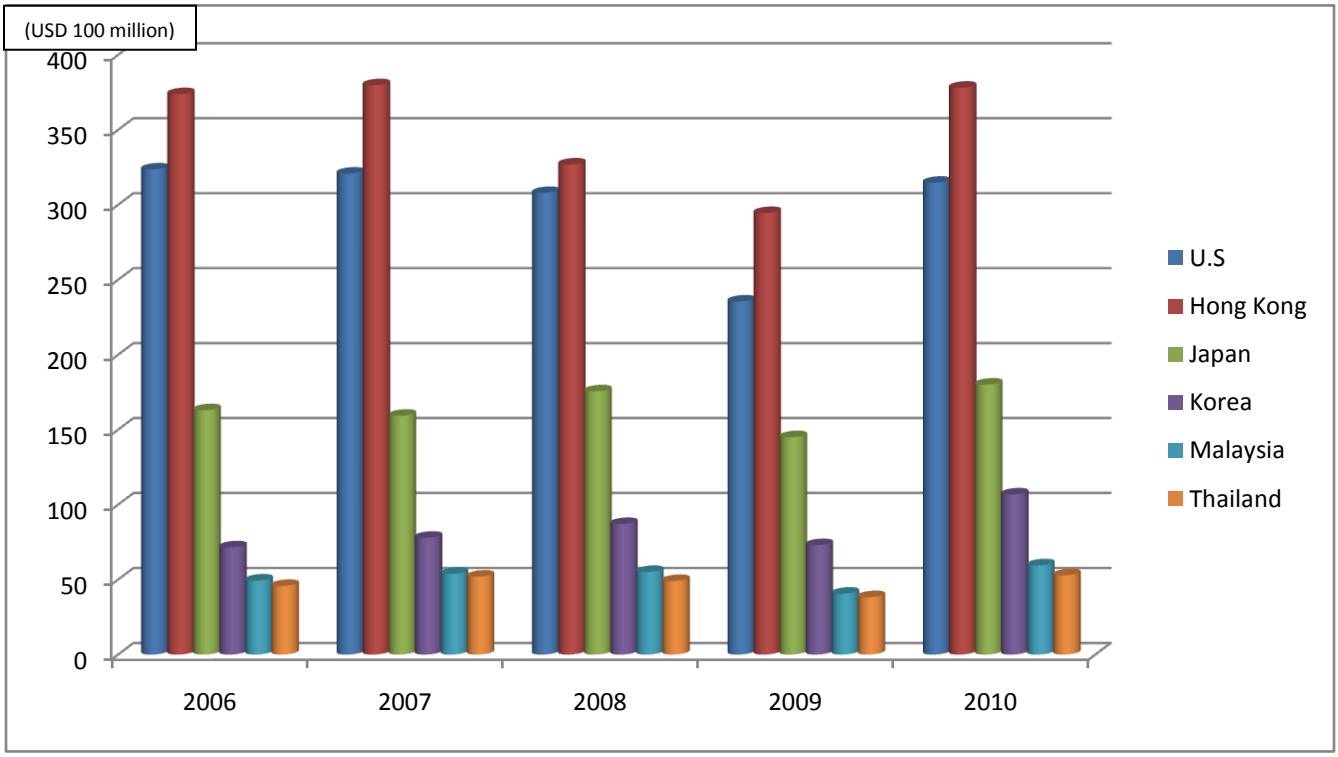
Figure 2.1 Compositions of Chinese Exports and Imports between 2003-2010



Source: China Statistical Year Book 2011

China has also become increasingly important within the global regional economy. The production within Asia has led to an increasing share of China's imports coming from within the region. This, together with increasing imports for domestic consumption, has made China among the most important imports origins and export destinations for other Asian countries. (Figure 2.2)

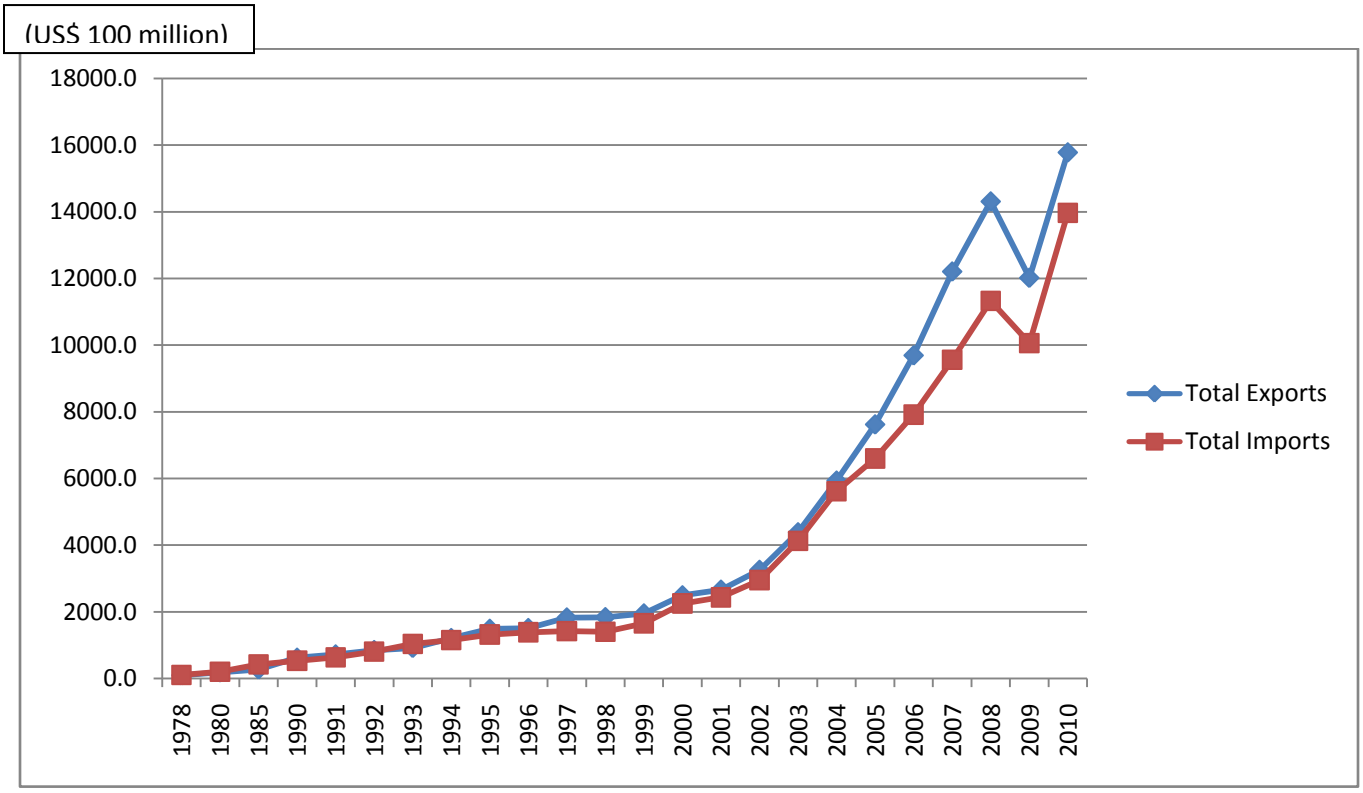
Figure 2.2 China's Major Exports Destinations



Source: China Statistical Year Book 2011

China's international trade has expanded steadily since the opening of the economy in 1979. This process began relatively slowly in the 1980s after the relaxation of pervasive and complex import and export controls, but started to increase in the 1990s with broader trade reforms, including significant tariff reductions. Both imports and exports have increased rapidly, and China's share in world trade has grown steadily since 1979, and since China entered WTO in 2001, its trade increased dramatically (Figure 2.3).

Figure 2.3 Growths in Trade



Source: China Statistical Year Book 2011

Chinese total exports grew from US$9.75 billion in 1978 to US$ 1.57775 trillion in 2010. It increased significantly within 30 years. Increased export earnings will ease constraints on growth

by enhancing the capacity to import essential goods, especially imports of intermediate and capital goods (Mahadevan, 2007). In other words, export expansion promotes increasing in capital and will result in increases overall economic growth. Some researcher's link trade to learning by doing and pointing out that the learning-spillover technology is consistent with the strong relationship between rapid productivity and international trade in China.

2.2.3 Foreign Direct Investment in China

Foreign Direct Investment (FDI) has contributed a great deal to China's extraordinary growth by injecting capital into the economy, creating jobs, transferring technology and knowledge, enhancing trade, bringing in competition for local enterprises, improving the quality of local labor and intermediate goods suppliers, and connecting China's gradually opening economy to the global market. The growing importance of FDI represents one of the defining features of globalization and the reshaping of the international business environment.

In 2011, overall world inflows of FDI rose to $1.5 trillion from $1.3 trillion in 2010. FDI flows into developing countries rose by 11% in 2011 to $684 billion, while flows into developed countries rose by 21% (in 2011) to $748 billion.

Table 2.2 below, shows FDI inflows to major world economies, both developed and developing, since 1970. In 2011 the US had the highest level of inflows ($227 billion), followed by China ($124 billion), Hong Kong ($83 billion), Brazil ($67 billion) and Singapore ($64 billion). This table illustrates, the FDI inflows in China increased and it has become the main destination in Asia.

Table 2.2: World FDI inflow 1970-2011

$ Millions	1970	1980	1990	2000	2009	2010	2011
Developed economies of which:	9,491	46,576	172,526	1,137,996	606,212	618,586	747,860
United Kingdom	1,488	10,123	30,461	118,764	71,140	50,604	53,949
France	621	3,328	15,629	43,252	24,219	30,638	40,945
Germany	770	342	2,962	198,277	24,156	46,860	40,402
Italy	624	577	6,345	13,375	20,077	9,178	29,059
(EU total)	5,158	21,279	97,309	698,244	356,631	318,277	420,715
Canada	1,823	5,807	7,582	66,795	21,406	23,413	40,932
Japan	94	278	1,806	8,323	11,938	1,252	1,758
United States	1,260	16,918	48,422	313,997	143,604	197,905	226,937
Developing economies of which:	3,854	7,479	34,853	255,506	519,225	616,661	684,399
Brazil	392	1,910	989	32,779	25,949	48,506	66,660
Russian Federation	...	...	…	2,714	36,500	43,288	52,878
India	45	79	237	3,588	35,596	24,159	31,554
China	...	57	3,487	40,715	95,000	114,734	123,985
Hong Kong, China	50	710	3,275	61,938	52,394	71,069	83,156
Mexico	312	2,099	2,633	18,110	16,119	20,709	19,554
Singapore	93	1,236	5,575	15,515	24,418	48,637	64,003
South Africa	334	10	78	887	5,365	1,228	5,807
Turkey	58	18	684	982	8,411	9,038	15,876
World	13,346	54,078	207,455	1,400,541	1,197,824	1,309,001	1,524,422

Source: UNCTAD, World Investment Report, 2012Flows

Since the reform and opening up strategy used in China, it has made great progress in attracting foreign capital. After more than 30 years of economic reform, China's economy has transformed from a centrally planned economy dominated by the state sector to a market-oriented economy consisted of firms with various ownership form. Central authorities of China have been making efforts in directing FDI from the eastern coast to farther inland.

According to the statistics of the Ministry of Commerce (MOC), between the time periods 1979 to 2010, there were altogether 712,324 projects with foreign capital the actual amount of US$1.250443 trillion. China has become the second-largest receiver of foreign capital. Along with the efforts on the adjustment of economic structure and change of foreign policy, the attraction of foreign capital went through four stages (Table 2.3 and Figure 2.4).

Table 2.3 The utilization of foreign capital in China between 1979 and 2010

Year	No. of projects	Contract amount (US$100 million)	Actual amount used (US$100 million)
1979-1984	3841	281.26	181.87
1985	3145	102.69	47.60
1986	1551	122.33	76.28
1987	2289	121.36	84.52
1988	6063	160.04	102.26
1989	5909	114.79	100.60
1990	7371	120.86	102.89
1991	13086	195.83	115.54
1992	48858	694.39	192.03
1993	83595	1232.73	389.60
1994	47646	937.56	432.13
1995	37184	1032.05	481.33
1996	24673	816.10	548.05
1997	21138	610.58	644.08
1998	19850	632.01	585.57
1999	17022	520.09	526.59
2000	22347	711.30	593.56
2001	26140	719.76	496.72
2002	34171	847.51	550.11
2003	41081	1169.01	561.40
2004	43664	1565.88	640.72
2005	44001	1925.93	638.05
2006	41473	1982.16	670.76
2007	37871	2046.63	783.39
2008	27514	2267.31	952.53
2009	23435	2113.25	918.04
2010	27406	2212.03	1088.21

Source: Ministry of Commerce (MOC), China Statistical Year Book, 2011

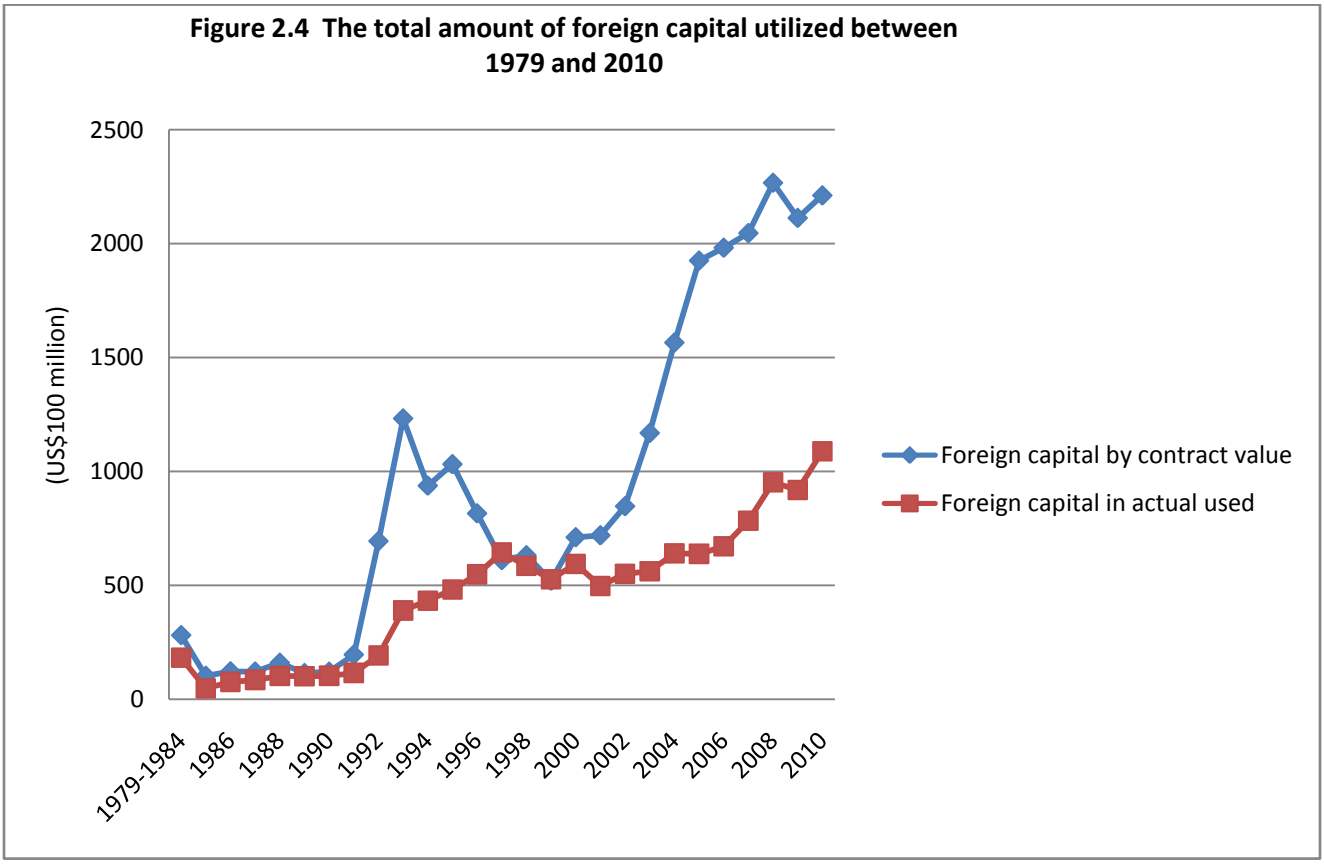
Stage one: 1979-1990

This was the beginning stage with slow growth of investment. There were altogether several thousand foreign invested projects. The total contract value amounted to US$102.333 billion, and the actual amount used was US$69.602 billion for the period 1979-1990.

Stage two: 1991-1993

This was the developing stage with fast growth of investment in both width and depth after the southern tour of Deng Xiaoping. The number of approved projects grew from 13,086 in 1991 to 83,595 in 1993, with the contract value growing from US$19.583 billion to US$123.273 billion, exceeding US$ 100 billion for the first time. The actual amount used also grew from US$11.554 billion to US$38.960 billion.

Figure 2.4 The total amount of foreign capital utilized between 1979 and 2010



Stage three: 1994-2000

This was the correction stage with slowing down of foreign investment in both project numbers and contract value. However, the actual amount used rose. The number of approved foreign invested projects dropped from 47,646 in 1994 to 17,022 in 1999, and the contract value dropped to US$52.009 billion in 1999. The actual foreign capital used amount steadily grew between 1994 and 1997, but due to the Southeast Asian financial crisis, it dropped in 1998 and 1999.

Stage four: 2001-present

This is the upgrade stage with increase in both the number of foreign-invested projects and contract value after the accession to the WTO. More attention has been given to the quality of foreign investment. The number of approved foreign invested projects grew from 26,140 in 2001 to 44,001 in 2005, then because of financial crisis it dropped to 27,514 in 2008, but increasing in actual amount used.

The increment of the share of foreign direct investments related to the plant productivity in some countries, positively. Therefore, the multinational organizations have higher value of the labor productivity than the domestic organizations. Foreign direct investments also increase the demand for the skilled labor which lead rise of the total wages of the skilled labor. This is because the multinational organizations usually have more skilled labour than the other economy (Aitken and Harrison, 1994; Blomstrom and Sjoholm, 1998; Feenstra and Hanson, 1997).

2.3 Conclusion

As briefly explained in this chapter, International trade and FDI play an important role in promoting Chinese economy. There is great significant in understanding China's processes of policy reform. Since the reform and opening up process started 30 years ago, and through the accession to the WTO, China have won markets and resources from home and abroad in common development and made the great achievements.

CHAPTER THREE

Literature Review

3.1 Introduction

Economic growth is the increase in the amount of the goods and services produced by an economy over time. It measured by the percentage change in GDP on an annual basis. Every country has a different economic growth, when the economists are attempting to understand why countries are growing at different rates, it is useful to know the economic growth models.

This chapter discusses the ideas in previous work on economic growth. Following this, it explains the theoretical studies on long-run growth theory, and presents definition of neoclassical growth model which is covers the Solow model, then the growth models with human capital. Next, the empirical results on the economic growth, exports and FDI are examined.

3.2 The neo-classical theory of growth

The neo-classical theory of growth was developed primarily to explain economic growth and is therefore set mainly in the context of an industrial economy. In such an economy, the two main factors of production are capital and labour. The theory is therefore primarily concerned with the way growth of output is influenced by the growth of labour, assumed to be given exogenously, and the growth of capital stock due to investment (Sundrum, 1990). The neo-classical growth theory can be represented by Solow model.

3.2.1 The Solow model

The long-run growth of neoclassical framework is the Solow model. The growth implied by the Solow model, focusing on the aggregate production function and the relationship between investment and growth rate of economy. In the basic Solow model, there is a closed economy producing one single (composite) good using both labour and capital (Agenor, 2004). The production function refers to the inputs of capital (K) and labour (L) which are necessary to produce output (Y). Using a Cobb-Douglas production function:

$$Y = F(K, L) = K^{\alpha}\mathrm{L}^{1-\alpha} \qquad \text{where, } 0<\alpha<1. \qquad (3.1)$$

This production function shows constant returns to scale, so that if all inputs are doubled, then output will double. The production in terms of output per worker and capital per worker, which are given respectively by:

$$y \equiv \frac{\mathrm{Y}}{\mathrm{L}}$$

$$k \equiv \frac{K}{L}$$

which gives $y = k$. The firms will produce more output per worker, if have more capital per worker.

The second equation of the Solow model will explains how capital is accumulated in the economy. The capital accumulation equation is given by:

$$\dot{K} = sY - dK \qquad (3.2)$$

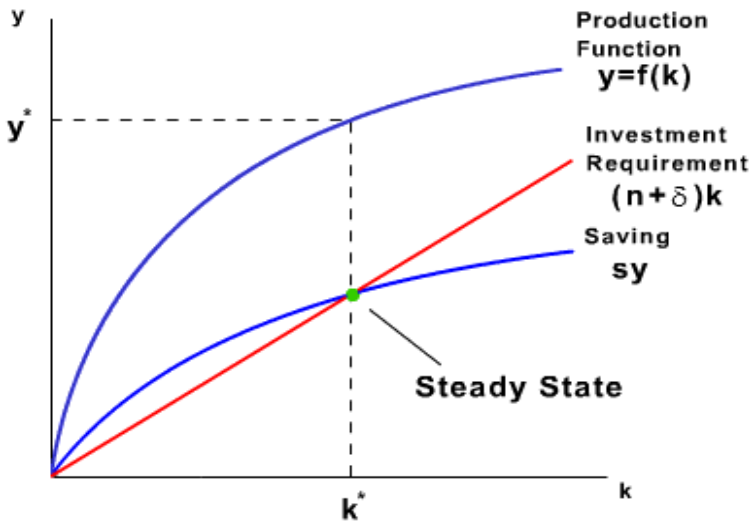
According to (3.2), the change in the capital stock, $\dot{K}$, is the difference between gross investment, sY and depreciation, dK. The model assumes that workers save a constant fraction, s, of their combined wage and rental income. Because the economy is closed, savings equals investment and investment is used to accumulate capital. Depreciation happens every period no matter of how much output is produced.

The capital accumulation equation in per worker terms:

$$\dot{k} = sy - (n + d)k$$

With taking the production function and capital accumulation together, can solve the Solow model. The production function in terms of output per worker is given by: $y = k^{\alpha}$. The equilibrium is found where the two curves meet. As shown in Figure 3.1, use the Solow diagram to find the steady state point of the economy.

Figure 3.1 Steady state in the Solow model



Because the steady-state quantity of capital per worker is determined by the condition, $\dot{k} = 0$. This means, there is no change in the capital-labour ratio over time so that the economy is at its steady state. If use substitution the production function in terms of output per worker, which is $y = k^{\alpha}$ in to the capital accumulation equation in per worker terms: $\dot{k} = sy - (n + d)k$ can be get $\dot{k} = sk^{\alpha} - (n + d)k$. Setting this equation to zero yields the steady-state quantity of capital per worker, as follows:

$$k^{*} = \left(\frac{s}{n+d}\right)^{1/1-\alpha} \qquad (3.3)$$

By substitute (3.3) into the production function (3.1), may get the steady-state output per worker:

$$y^* = \left(\frac{s}{n+d}\right)^{1/1-\alpha} \quad (3.4)$$

Therefore, as seen in equations and Figure 3.1, the solution is that if the countries accumulate more capital per worker, it will have more output per worker. The countries which have higher savings and investment rates will be richer than those who do not.

3.2.2 Solow model with technology

Although the result of the Solow model fits the empirical observation that countries have different per capita incomes, it does not explain why economies grow continuously over long periods of time. It takes the rate of saving, population growth, and technological progress as exogenous. There are two inputs, capital and labour, which are paid according to their marginal products (Mankiw, Romer, & Weil, 1992). When we use technological progress, need to include a technology variable, A, to the production function:

$$Y = F(K, AL) = K^{\alpha}(\mathrm{AL})^{1-\alpha} \quad (3.5)$$

In this formulation, the technology variable viewed as 'labour-augmenting', means that a unit of labour is more productive when it has higher level of technology. The variable, $\tilde{k}$, represents the ratio of capital per worker to technology. So, this refers to the fact that technological progress is labour-augmenting. Rewriting the production function is: $\tilde{y} = \tilde{k}^{\alpha}$, then the capital accumulation function in terms of $\tilde{k}$ is , $\dot{\tilde{k}} = s\tilde{y} - (n + g + d)\tilde{k}$. If the economy is below its steady state, the ratio of capital-technology will increase over time because of the amount of investment exceeds the amount needed to maintain the capital-technology ratio constant. In this case it will be true until $\tilde{y} = (n + g + d)\tilde{k}$, at point $\tilde{k}^*$. The economy is in steady state and grows at the rate of technological progress, g . With using the same method as Solow model without technology, let $\dot{\tilde{k}} = 0$, may find that,

$$\tilde{k}^* = \left(\frac{s}{n+g+d}\right)^{1/1-\alpha} \tag{3.6}$$

Substituting into the production function and in terms of output per worker,

$$y^*(t) = A(t)\left(\frac{s}{n+g+d}\right)^{\alpha/1-\alpha} \tag{3.7}$$

As a result, the different here is that output y^* and A both depend on time, so an economy can grow at the rate of technological progress. So, output per worker is determined by technology, the investment rate and population growth rate.

3.2.3 Growth models with human capital

Lucas (1988) extended the neoclassical model by assuming that individuals spend time increasing skills like going to school. The simple assumptions surrounding labour in the Solow model can be revised to include human capital, that is, workers with skills and education. By incorporate human capital (h) into the Solow model, may get:

$$Y = K^{\alpha}(\mathrm{hL})^{1-\alpha} \qquad (3.8)$$

Technology is still assumed to grow exogenously at rate, g. However, in this economy individuals accumulate human capital by spending time learning new skills. Thus, if an individual $1 - \mu$ devotes fraction of time learning, then

$$\dot{h} = (1 - \mu)h \qquad (3.9)$$

The solution to the neoclassical model with human capital in steady state is similar with the simple version of the Solow model. Assume the parameter $1 - \mu$ is constant and exogenously determined, so that $g = (1 - \mu)$, so, the capital accumulation equation can be written as:

$$\dot{\tilde{k}} = s\tilde{y} - (n + g + d)\tilde{k} \qquad (3.10)$$

Since, adding human capital does not change the basic predictions of Solow model, by setting $\dot{\tilde{k}} = 0$ and substation, can find equation in terms of output per worker,

$$y^*(t)=\mathrm{h(t)}\left(\frac{s}{n+g+d}\right)^{\alpha/1-\alpha} \qquad (3.11)$$

This solution suggests that, the extended Solow model explained why some countries are rich and others are poor. Some countries do well because they have high investment rates in physical capital, low population growth, higher technology level and spend a most of time accumulating human capital. In steady state, though, this extended Solow model still predicts that per capita output grows at the rate of technological progress, g, as in the simple model. It is clear, therefore, that the main determinant of long-run growth is technological progress. However, it is known as the variable outside of the neoclassical model.

In short, theory of economic growth suggests that the potential determinants of a country's economic growth are capital, labour, technology and human capital. Thus, in evaluating the impact of international trade and FDI on economic growth, we need to control the variable of capital, labour, technology and human capital.

3.3 Empirical Studies on Exports, FDI and Economic Growth

The export-led growth hypothesis implies that an increase in exports may lead to an increase in economic growth. The argument concerning the role of export on economic growth is not new. It goes back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth, since trade enables specification of labour and economics of scale.

There are several studies that provide a useful framework for analyzing the relationship between economic growth and export. For example, Feenstra (1990), Segerstrom, Anant and Dinopoulos (1990), Rivera-Batiz and Romer (1991), and Baldwin and Forslid (1996). The idea of these studies is that, exports increases productivity because of their impact on economics of scale, technology transfer, improving skills of workers, and increasing capacity of the economy.

Grossman and Helpman (1991) and Edwards (1992) emphasized the role of free trade in generating technological progress. A higher degree of openness allows smaller countries to absorb technology developed in advanced nations at a faster rate and thus grow, in equilibrium, more rapidly than economies with a lower degree of openness. Liu, Haiyan and Romily, (1997) argued that economic growth could cause trade expansion. And there is possibility of feedback effects from economic growth to exports.

Feder (1982) showed that exports can contribute to economic growth in a variety of ways; the use of large capacity utilization, economies of scale, incentives for technological progress and pressure of foreign competition, leading to more efficient management. Thus, marginal factor productivities would be higher in export industries than in non-export industries. He estimated

that, a ten percent increase in export without drawing resources from the non-export sector the productivity would increase by 1.3 percent.

Ram (1985) applied causality tests on a sample of 73 less developed countries to investigate the relationship between exports and economic growth for the periods 1960-1977, his study established that exports performance was an important determinant for economic growth.

However, more recent studies that have used longer time periods and recent advances in time-series econometrics in investigating the casual relationship between exports and economic growth have failed to provide significant support for the export-promotion development strategy. For example, Jung and Marshall (1985) analysed the lead and lag timing patterns between growth rate of real exports and growth rate of real output for 37 developing countries separately; in only four cases (Indonesia, Egypt, Costa Rica and Ecuador) they found evidence to support the export-promotion hypothesis. Dorado (1993) using data for more than 80 countries for 1961-1986 period, concluded that the granger causality test offers weak support for the notion of trade as an 'engine' of growth.

The role played by FDI in export performance of developing countries is one of the intensely debate issues in the literature of development economics. Hein (1992) and Lucas (1993) pointed out exports from host countries could lead FDI if outward-oriented export promotion is successful. In addition, the argument of causality from export to FDI can also rationalize from the supply side.

Liu and Wei (2001) applied Granger causality test to investigate possible casual relationships among three variables, FDI, export and imports in China based on a panel data covering 19 regions over the period 1984-1998. They found there is a one-way complementary causal link

from the growth in the inward FDI stock in China to the growth of China's exports to the regions.

Ashok Parikh (2001) analyzed the FDI and export expansion and its effect on GDP growth for 29 provinces in China, and he found that the relationship between exports, FDI and economic growth depends on the regional economic and social settings, including the level of development, industrial structure, policy orientation and degree of openness. Without attaining a certain level of development, an outward-looking policy and established comparative advantage, exports would be unlikely to affect economic growth effectively and would, therefore, not play the role of engine. The Chinese experience, especially the divergent growth performance and differential impacts of exports and foreign investment, confirms that export expansion and inflows of FDI can play an important role in accelerating economic growth within an open policy environment and development context.

The standard economic theory points to a direct, casual relationship between international trade and economic growth than can run in either direction. On the one hand, FDI flows can be induced by host country economic growth if the host country offers a sizeable consumer market, in which case FDI serves as a substitute for commodity trade. On the other hand, FDI may contribute to host country economic growth by expanding the country's capital stock, increasing technology transfer and skill acquisition or increasing competition in the local industry.

Empirically, the positive effect of host country economic growth on FDI inflows has been confirmed by various studies (Veugelers, 1991; Barrell and Pain, 1996; Grosse and Trevino, 1996; Taylor and Sarno, 1999; Trevino et al. 2002). The effects of FDI on economic growth has

been shown to be both positive (Dunning, 1993; Borensztein et. al. 1998; De Mello, 1999; Ericsson and Irandoust, 2001; Trevino and Upadhyaya, 2003) and negative (Moran, 1998).

FDI have great effect on the wages distribution of human capital where it is the main distribution of the wages, for example, the distributions of the wages between skilled and unskilled workers. Borenzstein, De Gregorio, Lee (1998) and Xu (2000) show that FDI brings technology, which translates into higher growth only when the host country has a minimum threshold of stock of the human capital. Alfaro, Chanda, Kalemli-Ozcan and Sayek (2004), Durham (2004), and Hermes and Lensink (2003) provide evidence that only countries with well-developed financial markets gain significantly from FDI in terms of their growth rates.

A large portion of studies implies the particular role of human capital for FDI to be beneficial to host countries; the contribution of human capital to growth is controversial in its own. At the micro level there is consistent evidence that education raises incomes significantly. Barro (1991), Bils and Klenow (2000), Mankiw (1992) use enrollment rates for primary and secondary education and point toward a positive and significant effect. However, Benhabib and Spiegel (1994), Kyriacou (1991), Lau (1991) and Pritchet (2001) found an insignificant result for the stock of human capital, the total means years of schooling.

The increment of the share of FDI related to the plant productivity in some countries, positively. Therefore, the multinational organizations have higher value of the labor productivity than the domestic organization. FDI also increases the demand for the skilled labor which lead rise of the total wages of the skilled labor. This is because the multinational organizations usually have more skilled labor than the other economy. (Aitken and Harrison,1994; Blomstrom and Sjoholm, 1998; Feenstra and Hanson, 1997).

With reference to the specification of Borensztein et al. (1998), researchers formulate a growth model in a linear form to empirically assess the effects of FDI and human capital on economic growth. Borensztein et al. (1998), presented a simple endogenous growth model in which FDI has a positive effect on growth, in the model, FDI affects growth via the accumulation of human capital. The effect of FDI on the growths rate of the economy is positively associated with the level of human capital. That is the higher level of human capital in the host country, the higher effect of FDI on the economic growth.

In short, previous empirical studies suggest that the potential determinants of country's economic growth are export, Foreign Direct Investment (FDI) and human capital.

3.4 Conclusion

The result of previous theory and study showing that technology, international trade and economic growth has its own relationship and link in helping the nation growth. Besides that, as argued in the economy growth theory, the human capital is important to the nation growth. After reviewing a brief literature on economic growth along with exports, FDI and human capital, since using of these variable for different countries whether in short-run or long-run, will brings different result. It is interesting to know that how does exports, FDI playing the role in Chinese economy by using time series data over period 1980-2010.

CHAPTER FOUR

Data and Methodology

4.1 Introduction

This chapter focuses on presentation of econometric models based on the theoretical arguments in the literature. The models of this paper are estimated by using annually time-series data from year 1980-2010. The Elliot, Rothenberg, and Stock (1996) (ERS) and Phillips and Perron (1988) (PP) unit-root test statistics are used to examine the stationarity of the data series. The Johansen cointegration testing approach is used to test the long-run relationship of exports, FDI, and economic growth. Moreover, Granger causality among exports and economic growth are investigated to examine the export- led growth, growth-led export hypotheses. Base on the results of analysis, this study provides some policy implications.

4.2 Sources of Data

This study uses data from variety of sources. The data are basically obtained from the secondary sources and are taken from Statistical Yearbook of the Republic of China (2010, 2011), international trade and investment report published by the Ministry of Commerce People's Republic of China, economic reports published by the Ministry of Finance, World

Investment Report, International Monetary Fund World Economic Outlook database, and from the World Bank data. The data are presented in appendix 1.

4.3 Model Specification and Techniques of data Analysis

The econometric models to examine in this study takes economic growth as dependent variable, and FDI, exports, imports and human capital variables are considered as independent variables. In the attempt to determine the relationships between economic growth and exports, FDI in China, the general model of this study is specified as:

$$EGr=f\ (\ FDI, Exp, Imp, Edu)$$

Where:

EGr= current GDP as a measure of economic growth (million US dollar)

FDI = foreign direct investment (million US dollar)

Exp = Chinese exports (million US dollar)

Imp = Chinese imports (million US dollar)

Edu = total school enrollment (people)

Then, in the next section, it is aim to explain the relevant econometrics procedures in testing time-series data. The most appropriate estimation techniques will be discussed under various conditions to achieve the objective of this study.

4.3.1 Unit Root Tests

The unit root test is meant to test the stationarity of the variables. Most of the study that using time-series data, have to test whether the data exist characteristics of stationary or not in order to accept the null hypothesis.

The unit-root test is conducted under Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1981) to check the order of integration of each of the variables. From the econometrics point of view a model containing non-stationary variable leads to a problem of spurious regression. To avoid spurious correlation problem, it is essential to test for unit root in series of each variable employed in the models. The procedure of this test as follow:

$$Y_t = \rho Y_{t-1} + U_t \qquad and, \quad -1 \leq \rho \leq 1 \qquad (4.1)$$

where Y_t is a variable of the interest and U_t is white noise error term, which follows zero mean with a unit variance. The order of integration is the number of unit root contained in the series, or a non-stationary series has to be differenced before attaining stationary. For example, a series Y_t integrated of order zero is denoted as $Y_t \sim$ I(0), which means that this series is stationary without any differencing, if the variable is differenced once and the differenced series is stationary, then it is integrated of order one I (1). Similarly, if it is differenced twice and differenced series is stationary, then it is integrated of order two I (2) and so on. However, if U_t violates the above assumption the equation (4.1) is to be modified with p-lagged changes in the dependent variable as an additional regression, which is as follow:

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \sum_{i=1}^{\rho} \alpha_i \Delta Y_{t-i} + \varepsilon t \qquad (4.2)$$

where, Δ is a first-difference operator, Y_t is the relevant time series, ε_t is the error term, while β_1 is the set of parameters to be estimated. In equation (4.2), the null and alternative hypothesis in unit roots test is:

H_0: $\delta = 0$ (y_t is non-stationary)

H_1: $\delta \neq 0$ (y_t is stationary)

The H_0 hypothesis can be rejected if the calculate ratio of the coefficient δ is lower than the critical value tabulated. In other words, a unit root exists in the series Y_t (implies non-stationary) if the null hypothesis of δ equals zero that is not rejected (Gujarati, 1995).

4.3.2 Cointegration Test

The notion of cointegration, which was given a formal treatment in Engle and Granger (1987), makes regressions involving I (1) variables potentially meaningful. It is provides the long-run relationship between the economic variables and the deepest idea for cointegration test is relevant to the functional form of the model.

In other word, the variables can be cointegrated if two (or more) series are linked to form an equilibrium relationship in the long-run, and the variables are stationary at same order of integration, i.e. cointegrated at I(1). If variables non-stationary at their level and stationary at the first difference and there is also exist linear combination among the stationary variables, then these non-stationary series are said to be cointegrated. The stationary linear combination is called the cointegration equation (Engle and Granger, 1987).

Testing for cointegration can be done by using the approach that was proposed by Johansen (1988). Johansen developed a maximum likelihood estimation procedure that allows one to test for the number cointegrating relations. Although there're exists a number of cointegration tests, Johansen's test has a number of desirable properties, including the fact that all test variables are treated as endogenous variables. If the null hypothesis of no cointegration vector can be rejected, it indicated that there is a long-run relationship among the variables in the model. By using Johansen approach, it will involve the test of cointegrating vectors.

$$Y_t = \prod_1 Y_{t-1} + \prod_2 Y_{t-2} + \dots + \prod_k Y_{t-k} + \varepsilon_t \qquad t = 1,2, \dots , n \qquad (4.3)$$

where Y_t is N×1 vector of stochastic variable, $\prod_1, \prod_2, \dots, \prod_k$ is the n×n parameter and ε_t is the error term. When Y_t is non-stationary, the above equation can be written as below:

$$\Delta Y_t = \mu + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_k \Delta Y_{t-k} + \prod Y_{t-1} + \varepsilon_t \quad (4.4)$$

where, $\Pi = \alpha\beta'$

In this equation, the element of α is known as the adjustment parameters in the vector error correction model and β' shows the cointegration vector. This procedure is used to test the existence of a long run relationship among the variable and in this study, the main variables are economic growth, FDI and exports. It is important to test whether a stationary long-run relationship exist among the series because failure to account for cointegration will cause misspecification and this might undermine the validity of parameter estimates, thus a test for cointegration can be thought of a pre-test to avoid spurious regression (Engle & Granger, 1987).

4.3.3 Error Correction Model

The cointegrating regression so far considers only the long-run property of the model, and does not deal with the short-run dynamics explicitly. Clearly, a good time series modelling should describe both short-run dynamics and the long-run equilibrium simultaneously. For this purpose now need to develop an error correction model (ECM).

Error correction models are based on the assumption that two or more time series exhibit an equilibrium relationship that determines both short-run and long-run behavior. It integrates the short-run dynamics with the long-run equilibrium without losing long-run information. If y_t and

x_t are I(1) process and are not cointegrated, we might estimate a dynamic model in first differences. In following equation,

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \gamma_0 \Delta x_t + \gamma_1 \Delta x_{t-1} + u_t \qquad (4.5)$$

where u_t has zero mean given $\Delta x_t, \Delta y_{t-1}, \Delta x_{t-1}$, and further lag.

If $y_t \; and \; x_t$ are cointegrated with parameter β, then we have additional I(0) variables that we can include in equation (4.5). Let $s_t = y_t - \beta x_t$, so that s_t is I(0), and assume s_t has zero mean. If we include one lag of s_t:

$$\begin{aligned} \Delta y_t &= \alpha_0 + \alpha_1 \Delta y_{t-1} + \gamma_0 \Delta x_t + \gamma_1 \Delta x_{t-1} + \delta s_{t-1} + u_t \\ &= \alpha_0 + \alpha_1 \Delta y_{t-1} + \gamma_0 \Delta x_t + \gamma_1 \Delta x_{t-1} + \delta (y_{t-1} - \beta x_{t-1}) + u_t \end{aligned} \qquad (4.6)$$

where, $E(u_t | I_{t-1}) = 0$, and I_{t-1} contains information on Δx_t and all past values of $x \; and \; y$. The term $\delta(y_{t-1} - \beta x_{t-1})$ is called the error correction term, and equation (4.6) is an example of the Error Correction Model.

An error correction model allows us to study the short-run dynamics in the relationship between $y \; and \; x$. If consider the model without lags of Δy_t and Δx_t:

$$\Delta y_t = \alpha_0 + \gamma_0 \Delta x_t + \delta (y_{t-1} - \beta x_{t-1}) + u_t \qquad (4.7)$$

where $\delta < 0$. If $y_{t-1} > \beta x_{t-1}$, then y in the previous period has overshot the equilibrium; because $\delta < 0$, the error correction term works to push y back toward the equilibrium. Similarly, if $y_{t-1} < \beta x_{t-1}$, the error correction term induce a positive change in y back toward the equilibrium. Thus, all the variables in the ECM are stationary, and therefore the ECM has no spurious regression problem.

4.3.4 Vector Autoregressive Models (VAR)

Multivariate simultaneous equations models were used extensively for macroeconometric analysis when Sims (1980) advocated vector autoregressive (VAR) models as alternatives. At that time longer and more frequently observed macroeconomic time series called for models which described the dynamic structure of the variables. VAR models lend themselves for this purpose. They typically treat all variables as a priori endogenous.

In this model, we model several series in terms of their past, that is where the word vector comes from. This model is popular in empirical macroeconomics literature, because it is related to the notion of cointegration and causality. If we have two series, $x_t \; and \; y_t$, a vector autoregression consists of equations that look like:

$$x_t = \delta_0 + \alpha_1 x_{t-1} + \gamma_1 y_{t-1} + \alpha_2 x_{t-2} + \gamma_2 y_{t-2} + \cdots$$

and (4.8)

$$y_t = \eta_0 + \beta_1 x_{t-1} + \rho_1 y_{t-1} + \beta_2 x_{t-2} + \rho_2 y_{t-2} + \cdots$$

where each equation contains an error that has zero expected value given past information on $x \; and \; y$.

VAR models can be useful for forecasting. Equations such as (4.8) allows us to test whether, after controlling for past x , past y help to forecast x_t .Generally, we say that $y \; Granger \; causes \; x \; if$

$$\mathrm{E}(x_t|\mathrm{I}_{t-1}) \neq \mathrm{E}(x_t|\mathrm{J}_{t-1}), \qquad (4.9)$$

where I_{t-1} contains past information on $x \; and \; y$, and J_{t-1} contains only information on past x. When (4.9) holds, past y is useful, in addition to past x, for predicting x_t. The term "causes" in

Granger causes should be interpreted with caution. The only sense in which y causes x is given in (4.9). In particular, it has nothing to say about contemporaneous causality between $x \; and \; y$, so it does not allow us to determine whether y_t is an exogenous or endogenous variable in an equation relating $x_t \; to \; y_t$.

VAR model is truly simultaneous system in that all variables are regarded as endogenous considering the feedback effects in the system, and it can estimated by ordinary least squares without resorting any system method such as two-stage least squares (Shan and Sun, 1998).

4.4 Conclusion

This chapter explained the time series analysis technique step by step in order to get the result and investigate the model relationship. While in next chapter, it will discuss the result and analysis to achieve the objective of this study.

CHAPTER FIVE

Result and Analysis

5.1 Introduction

This chapter discusses the results and findings which produce by the econometric techniques that presented in Chapter 4. The results and findings are presented in three sections: Augmented Dickey-Fuller (ADF) test for stationary of series, Granger Casuality test, and VAR models.

5.2 Results of Unit Root Tests

To test the order of integration of the variables, this study used the standard tests for unit root, namely the Augmented Dickey-Fuller (ADF). As mentioned earlier, the stationary test of the time series is needed in order to avoid the problem of spurious regression.

The results of unit root tests are presented in Table 5.1. These tests take into consideration of three types ADF test: constant without trend, constant with trend and without constant and trend.

Table 5.1 Unit Root Test

Variable	Constant	Constant & trend	None	Result
GDP (%)				
Level	-4.6872*	-4.5522*	-0.5204	I(0)
FDI				
Level	0.9488	-1.6477	2.5195	I(1)
1^{th} difference	-2.8953*	-3.0955	-2.0074**	
EXP				
Level	2.9880	0.5679	3.9623	
1^{th} difference	-1.8780	-2.7179	-1.4202	I(2)
2^{th} difference	-4.3708***	-4.1734**	-4.3711***	
IMP				
Level	4.9182	1.8302	6.0754	
1^{th} difference	-1.4449	-2.6281	-0.8168	I(2)
2^{th} difference	-5.6561***	-5.5669***	-5.5639***	
X_1				
Level	0.9900	-0.4000	2.4214	I(1)
1^{th} difference	-2.4377	-2.6532	-1.7734*	
X_2				
Level	-0.2479	-1.6872	0.2703	
1^{th} difference	-1.6189	-1.9647	-0.9734	I(2)
2^{th} difference	-4.3836***	-4.3136**	-4.4557***	
X_3				
Level	-0.5065	-1.8186	-0.1551	
1^{th} difference	-1.6211	-1.7263	-1.0934	I(2)
2^{th} difference	-3.0920**	-3.0114	-3.1580***	
X_4				
Level	1.7482	0.1865	2.2006	
1^{th} difference	-1.8318	-3.1424	-1.1962	I(2)
2^{th} difference	-4.3744***	-4.5007***	-4.3149***	
X_5				
Level	3.3865	2.4434	3.5967	
1^{th} difference	-1.5019	-2.7330	-1.0612	I(2)
2^{th} difference	-7.2043***	-8.4776***	-6.8489***	

Note 1: ***, **, * indicates the rejection of null hypothesis of non – stationary at 1%, 5% and 10% significant level.

2: $X_1 = No.of\ institutes\ of\ higher\ learning$

$X_2 = No.of\ students\ enrolled\ (10{,}000)$ $X_3 = No.of\ masters\ from\ Local\ Universities,$

$X_4 = No.of\ students\ studying\ abroad$ $X_5 = No.of\ returned\ students$

Based on Table 5.1, the dependent variable, growth in GDP, is found to be stationary at I (0), so it contains no unit root. When the ADF test is conducted at first difference for FDI and X_1 (No. of institutes of higher learning), without constant and trend, the null hypothesis of non-stationary can be rejected. For other variables Export, Import, X_2 (No. of students enrolled), X_3 (No. of masters from Local Universities), X_4 (No. of students studying abroad), X_5 (No. of returned students) they are found to be I (1) process.

It can be said that the result of unit root test where it indicates that GDP and FDI are stationary at first differences and integrated of order one, and export , import stationary at second differences and integrated of order two.

5.3 Granger Causality test

Granger Causality Test is used to see the causal relationship between the variables studied, namely economic growth, FDI, export, and import. By testing to see whether the two variables have a relationship of mutual influence (two-way relationship), has a direct relationship or no relationship (no interaction).

Table 5.2 Result of Granger Causality

Null Hypothesis:	Obs	F-Statistic	P-Value
FDI does not Granger Cause EXPORT EXPORT does not Granger Cause FDI	29	1.84648 1.97270	0.17952 0.16099
GDP does not Granger Cause EXPORT EXPORT does not Granger Cause GDP	29	1.46779 0.11979	0.25039 0.88763
IMPORT does not Granger Cause EXPORT EXPORT does not Granger Cause IMPORT	29	14.0175 7.22177	0.0000*** 0.00350***
GDP does not Granger Cause FDI FDI does not Granger Cause GDP	29	3.78331 0.21823	0.03731** 0.80552
IMPORT does not Granger Cause FDI FDI does not Granger Cause IMPORT	29	2.20489 1.80561	0.13211 0.18600
IMPORT does not Granger Cause GDP GDP does not Granger Cause IMPORT	29	0.14284 2.40333	0.86762 0.11185

*Note: "***"and "**" represents 1% and 5% significant level respectively*

Table 5.2 presented granger causality between economic growth, FDI, export and import. Results revealed that economic growth in China is not caused by export, import and FDI statistically. The result also shows that the null hypothesis for export does not granger cause FDI is failed to be rejected, since p-value greater than the significance level (1%, 5%, and 10%), so it can be concluded that there is no relationship between export and FDI.

Export did not affect the rate of economic growth and also can be saying that, economic growth did not affect export. On the other hand, the null hypothesis for import does not granger cause export and export does not granger import can be rejected, so it can be concluded that two variables have a relationship of mutual influence (two-way relationship) because of intra-trade and imports of intermediate goods, technology and export of industrial products.

Result of economic growth and FDI show that the null hypothesis for economic growth does not granger cause FDI is rejected at 5% significance level, so it can be conclude that economic growth has a significant influence on FDI.

This result is in accordance with our expectation that economic growth will provide a positive influence on the level of FDI. According to theory and empirical studies, among the main determinants is the market size of the host country would have effect on economic prospective. FDI flows can be induced by host country economic growth if the host country offers a sizable consumer market. So overall, we can conclude that economic growth and FDI has only one-way relationship.

Table 5.2 also shows granger causality between economic growth, FDI with import. The results show that the null hypothesis for economic growth does not granger cause import and vice versa is failed to be rejected since p-value greater than the significance level (1%, 5% and 10%). So, we can conclude that economic growth and import do not affect each other (no relation), FDI and import also do not affect each other, statistically.

5.4 Vector Autoregressive (VAR) and Impulse Response Function (IRF) Analysis

A Vector Autoregressive (VAR) Model used to show dynamic effect of the impact of unitary shocks on a variety of macroeconomics variables. The main purpose of using the VAR model is to analyze the impact dynamic of random disturbances on the system. In this study, because the variables export and import are stationary at second difference, before analysis VAR model, we need to transform the variables itself to second difference, and FDI transform to first difference as it is stationary at I (1) process. The result of VAR as shown below,

Table 5.3 Vector Autoregression Estimates (VAR)

	GDP	FDI1	EXPORT2	IMPORT2
GDP(-1)	0.715976	-5.039064	-45.24048	-36.50515
	(0.20994)	(6.22104)	(98.8062)	(71.2920)
	[3.41035]**	[-0.81000]	[-0.45787]	[-0.51205]
GDP(-2)	-0.522308	5.385050	-37.39550	-20.50409
	(0.19294)	(5.71715)	(90.8031)	(65.5175)
	[-2.70714]	[0.94191]	[-0.41183]	[-0.31296]
FDI1(-1)	-0.011469	0.294432	5.001363	3.167756
	(0.00991)	(0.29360)	(4.66307)	(3.36456)
	[-1.15754]	[1.00285]	[1.07255]	[0.94151]
FDI1(-2)	-0.007154	0.194530	-0.046218	0.541622
	(0.00965)	(0.28592)	(4.54109)	(3.27655)
	[-0.74139]	[0.68037]	[-0.01018]	[0.16530]
EXPORT2(-1)	-0.001674	0.044405	0.370188	0.177364
	(0.00165)	(0.04894)	(0.77723)	(0.56079)
	[-1.01391]	[0.90742]	[0.47629]	[0.31627]
EXPORT2(-2)	0.000847	0.071290	-0.481938	-0.307258
	(0.00272)	(0.08074)	(1.28233)	(0.92525)
	[0.31095]	[0.88298]	[-0.37583]	[-0.33208]
IMPORT2(-1)	0.003638	-0.124676	-2.544648	-1.947171
	(0.00243)	(0.07191)	(1.14211)	(0.82407)
	[1.49906]	[-1.73378]	[-2.22802]	[-2.36287]
IMPORT2(-2)	0.000125	-0.080478	-0.512346	-0.788251
	(0.00278)	(0.08237)	(1.30825)	(0.94395)
	[0.04514]	[-0.97703]	[-0.39163]	[-0.83506]
C	7.579249	-22.25079	1120.071	838.7580
	(1.93865)	(57.4462)	(912.394)	(658.323)
	[3.90956]**	[-0.38733]	[1.22762]	[1.27408]
R-squared	0.584755	0.307289	0.668501	0.732746
Adj. R-squared	0.400202	-0.000583	0.521168	0.613967
Sum sq. resids	85.65093	75206.86	18971430	9876735.
S.E. equation	2.181372	64.63868	1026.630	740.7479
F-statistic	3.168490	0.998108	4.537345	6.168971
Log likelihood	-53.89632	-145.3955	-220.0565	-211.2444
Akaike AIC	4.658987	11.43670	16.96715	16.31440
Schwarz SC	5.090933	11.86865	17.39910	16.74635
Mean dependent	10.29963	-33.15037	139.3463	143.7833
S.D. dependent	2.816613	64.61986	1483.618	1192.225

Determinant resid covariance (dof adj.)	7.46E+14
Determinant resid covariance	1.47E+14
Log likelihood	-593.6736
Akaike information criterion	46.64249
Schwarz criterion	48.37027

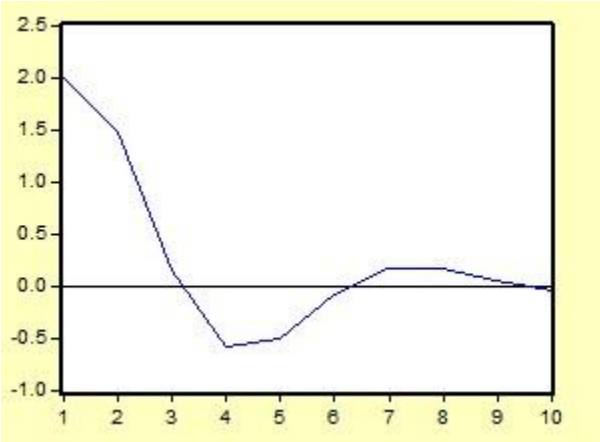
*Note1: "**" represent at 5% significant level*
2: Standard errors in ( ) & t-statistics in [ ]

The design of this VAR model is used GDP, FDI, export, and import as the endogenous variables. From the Table 5.3, I found that, only the lagged values of GDP are found significant at 5%. This implies that, economic growth in China is influencing by the GDP itself. It is only the past value of GDP has effect on economic growth. Similar results are also found in VAR model with endogenous values of GDP, FDI, export, import, X_1, X_2, X_3, X_4, X_5 . (See Appendix 3).

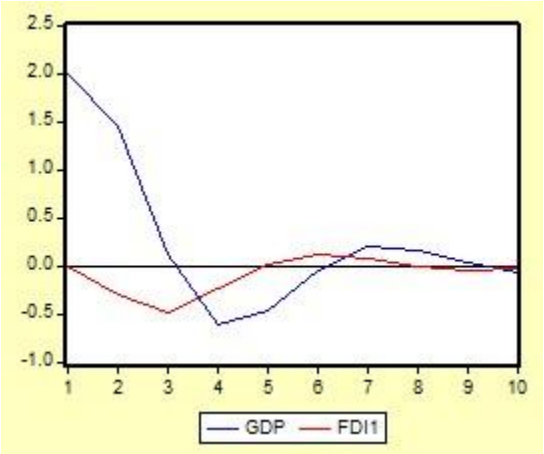
For further analysis the relationships between these variables, I use Impulse Response Function (IRF). Since the individual coefficient in the estimated VAR model is often difficult to interpret, the use of this IRF technique estimate the dynamic interactions among the variable. Figure 5.2 generates impulse response function from the estimated VAR, shows the combined response graphs with impulse response over 10 year periods.

Figure 5.1 Result of Impluse Response Function

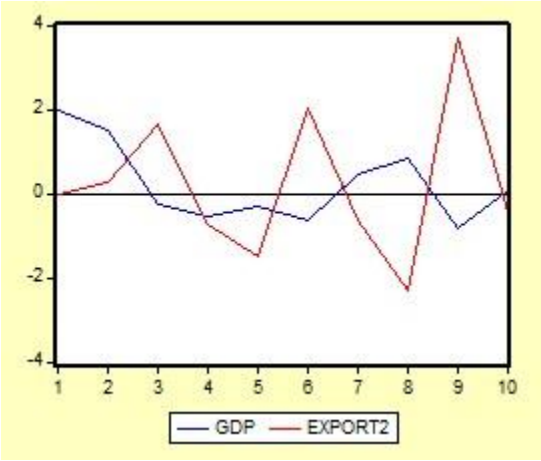
Response of GDP to one S.D. GDP Innovation



Response of GDP to one S.D. FDI1 Innovation



Response of GDP to one S.D. EXPORT2 Innovation



Response of GDP to one S.D. IMPORT2 Innovation

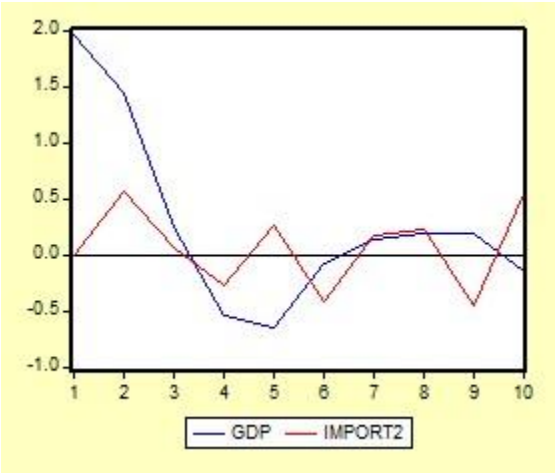


Table 5.4 is for interpret the response of GDP to one standard deviation shock in GDP, FDI1, export2 and import2.

Table 5.4 Response of GDP to one S.D. shocks in GDP, FDI1, Export2 & Import2

Period	GDP	FDI1	EXPORT2	IMPORT2
1	1.986476	0.000000	0.000000	0.000000
	(0.26545)	(0.00000)	(0.00000)	(0.00000)
2	1.438447	-0.296134	0.239770	0.566664
	(0.37015)	(0.40929)	(0.43669)	(0.39555)
3	0.123584	-0.489463	1.643135	0.067696
	(0.39720)	(0.49820)	(1.55028)	(1.03255)
4	-0.606509	-0.232793	-0.758490	-0.279221
	(0.39720)	(0.29070)	(0.69132)	(0.94002)
5	-0.477926	0.014959	-1.500530	0.259277
	(0.33456)	(0.18090)	(2.58146)	(0.56920)
6	-0.049324	0.123806	2.004000	-0.426353
	(0.25881)	(0.15975)	(2.99399)	(0.49515)
7	0.197998	0.068947	-0.625339	0.169133
	(0.24896)	(0.10083)	(2.07620)	(1.19438)
8	0.163670	-0.008948	-2.287886	0.227157
	(0.18931)	(0.06925)	(7.04580)	(1.74160)
9	0.021621	-0.042262	3.674222	-0.449924
	(0.13011)	(0.06899)	(6.49753)	(1.58903)
10	-0.063710	-0.025023	-0.447638	0.542780
Total effect	2.734327	-0.88691	1.941244	0.677209

As the IRF analysis indicates that, one standard deviation shock in GDP fluctuations will generate a mixture of positive and negative impact on economic growth. The positive impact is the highest on the first year. Then it down become negative in year 4, and rebound back from year 4 to 7. From year 8, it fluctuates and become negative in final year. Over all the 10 year, the shock's of GDP fluctuations has total positive effect of 2.734% on economic growth. Since the GDP response from FDI, export and import are not significant, I do not interpret it.

5.5 Conclusion

Based on the findings, this study indicates that there is a causal relationship among economic growth and FDI, and have a relationship of mutual influence between export and import. The Granger Causality test shows that economic growth granger cause FDI, but economic growth does not affected by FDI, which means that a change in economic growth will effect on level of FDI (one relationship). Export Granger cause import and import Granger cause export, this implies export and import has two way relationship. From Granger cause analysis we can conclude that economic growth is not influenced by any of these independent variables. Vector Autoregressive (VAR) and Impulse Response Function (IRF) approach shows that the country's economic growth is affected by the past values of GDP.

CHAPTER SIX

Conclusion and Policy Implication

6.1 Conclusion

The main purpose of this study was to test the relationship between economic growth, foreign direct investment (FDI), exports and import during the period over 1980-2010 in China. An effort has been made to base the present work on reasonable empirical and theoretical foundations. Besides the discussion of potential positive effects of export and FDI on the Chinese economy, a reasonable growth model and econometrics model is specified, and a time-series data for recent period have been used.

The granger causality tests between economic growth, FDI, export and also import have been conducted to examine causality between these variables. There is a one-way causality which runs from economic growth to FDI. It means that the increase in economic growth each year will affect the increase in the level of FDI, but result does not support the Granger causality between economic growth and exports in China. On the other hand, for export and import, we found that export has a significant influence on import; also import has an effect on export. This mutual influence can explain that when China increases the imports of advanced technology and equipment it drives export of light manufacturing or more sophisticated electronics and industrial supplies, and vice versa.

This study also used Vector Autoregressive (VAR) and Impulse Response Function (IRF) to investigate the response of the system to economic shocks. The impulse function illustrates the dynamic relationship between economic growth, FDI, export and import.

Results reveal that economic growth in China is significant influenced by its own past values. While Impulse Response Function showed that shocks to economic growth lead to a significant positive response in GDP. Based on our result we may conclude that economic growth in China is only affecting by itself, not significantly influencing by FDI, export and import.

6.2 Policy Implications

In policy context, the findings of the study are raised the awareness of policy makers that Foreign Direct Investment (FDI) will increase as economic growth increase in China. Therefore, government policies should be geared towards increase economic growth in order to increase FDI.

Based on the findings, economic growth has a positive impact on FDI. Economic growth is reflected from the process of increasing income per capita and production capacity. Increase production capacity, can increase the form of physical capacity, such as the increasing number of production facilities and infrastructure built by the government, and its production capacity in human resources quality. Increased production capacity in human resources, as evidenced by the increase in skills and technological workers can attract foreign investment.

Meanwhile, our result shows that there is no specific relationship between economic growth and export either in short run or long run. This means that there may be other channel through which these variables might be influencing each other or not.

Based on the results and findings, to achieve a sustainable economic growth in China, government should focus on the values of economic growth itself. In traditional national income accounts, the Gross Domestic Product is represented as:

$$Y = C + I + G + (X – M),$$

where, Y = GDP, C = household consumption, I = gross investment, G = government purchases, and X and M are exports and imports of goods and services respectively. The term net exports, is often used to refer to X-M. If consumption cannot play a much larger role in aggregate demand, then China's rapid growth will slow down or even stop at some time in the future. Therefore, the growth model of China is affecting by its own lagged value of GDP, so ensure no drop in GDP, the growth will increase and persistent.

Based on the causality test, FDI will lead to export growth, so the policy focus should be not only to make the home environment competitive but also get market access for their products abroad and also improve the competitiveness of export products.

6.3 Recommendation for Future Research

The findings of this study may shed some light about the causal relationship and cointegration among economic growth, FDI, export and import in China. Subsequently, they may also stimulate interests in further analysis and enhance the scope of the matter.

Since this study only use data for 30 years, future researchers should have a larger data or can divide the dataset into quarterly so as to provide better results. The limitation of this study is that the analysis only observes the causal relationship and Vector Autoregressive between economic growth and FDI, export as well as the import. Future studies may include other potential determinants that may affect economic growth such as government spending, foreign capital inflows, unemployment rate, and other explanatory variables to use cointegration approach or other method. Besides that, future study may expand the scope of the study by making a comparison with other countries such as ASEAN countries in order to compare how the results differ across countries.

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APPENDIX

Appendix 1: Data

Year	GDP growth (annual %)	FDI (US$100 million)	Exports (US$100 million)	Imports (US$100 million)
1980	7.8	33.83	180.99	200.2
1981	5.2	42.2	220.07	220.14
1982	9.1	22.98	223.21	192.85
1983	10.9	19.81	222.26	213.9
1984	15.2	27.05	261.39	274.1
1985	13.5	47.6	273.5	422.52
1986	8.8	76.28	309.42	429.04
1987	11.6	84.52	394.37	432.16
1988	11.3	102.26	475.16	552.68
1989	4.1	100.6	525.38	591.42
1990	3.8	102.89	620.91	533.5
1991	9.2	115.54	719.1	637.9
1992	14.2	192.03	849.4	805.9
1993	14	389.6	917.44	1039.6
1994	13.1	432.13	1210.06	1156.1
1995	10.9	481.33	1487.8	1320.8
1996	10	548.05	1510.48	1388.3
1997	9.3	644.08	1827.92	1423.7
1998	7.8	585.57	1837.12	1402.4
1999	7.6	526.59	1949.31	1657.0
2000	8.4	593.56	2492.03	2250.9
2001	8.3	496.72	2660.98	2435.5
2002	9.1	550.11	3255.96	2951.7
2003	9.99	561.4	4382.28	4127.6
2004	10.1	640.72	5933.26	5612.3
2005	11.3	638.05	7619.53	6599.5
2006	12.7	670.76	9689.36	7914.6
2007	14.2	783.39	12204.6	9561.2
2008	9.6	952.53	14306.9	11325.7
2009	9.2	918.04	12016.1	10059.2
2010	10.4	1088.21	15777.5	13962.4

Year	No. of institutes of higher learning	No. of students enrolled (10,000)	No. of masters from Local Universities	No. of students studying abroad	No. of returned students
1980	675	28.1	476	2124	162
1981	704	27.9	11669	2922	1143
1982	715	31.5	4058	2326	2116
1983	805	39.1	4497	2633	2303
1984	902	47.5	2756	3073	2920
1985	1061	61.9	17004	4888	1424
1986	1054	57.2	16950	4676	1388
1987	1063	61.7	27603	4703	1605
1988	1075	67.0	40838	3786	3000
1989	1075	59.7	37232	3329	1753
1990	1075	60.9	35440	2950	1593
1991	1075	62.0	32537	2900	2069
1992	1053	75.4	25692	6540	3611
1993	1065	92.4	28214	10742	5128
1994	1080	90.0	28047	19071	4230
1995	1054	92.6	31877	20381	5750
1996	1032	96.6	39652	20905	6570
1997	1020	100.0	46539	22410	7130
1998	1022	108.4	47077	17622	7379
1999	1071	159.7	54670	23749	7748
2000	1041	220.6	58767	38989	9121
2001	1225	268.3	67809	83973	12243
2002	1396	320.5	80841	125179	17945
2003	1552	382.2	111091	117307	20152
2004	1731	447.3	150777	114682	24726
2005	1792	504.5	189728	118515	34987
2006	1867	546.1	255902	134000	42000
2007	1908	565.9	311839	144000	44000
2008	2263	607.7	344825	179800	69300
2009	2305	639.5	371273	229300	108300
2010	2358	661.8	383600	284700	134800

Appendix 2: Result of Unit Root Test (in % changes)

Variable	Constant	Constant & trend	None
growth in GDP(per capita)			
Level	4.3031	3.1932	4.3540
1^{th} difference	0.0914	-1.5555	0.7465
growth in EXP			
Level	2.9880	0.5679	3.9623
1^{th} difference	-1.8780	-2.7179	-1.4202
growth in IMP			
Level	4.9182	1.8302	6.0754
1^{th} difference	-1.4449	-2.6281	-0.8168
growth in X_2			
Level	-0.2503	-1.6887	0.2679
1^{th} difference	-1.6189	-1.9635	-0.9738
growth in X_3			
Level	-0.5065	-1.8186	-0.1551
1^{th} difference	-1.6211	-1.7263	-1.0934
growth in X_4			
Level	1.7482	0.1865	2.2006
1^{th} difference	-1.8318	-3.1424	-1.1962
growth in X_5			
Level	3.3865	2.4434	3.5967
1^{th} difference	-1.5019	-2.7330	-1.0612

Appendix 3: Result of Autoregression Estimates (VAR)

Endogenous: GDP, FDI, EXPORT, IMPORT

Exogenous: control variables=x1,x2,x3,x4,x5

	GDP	FDI1	EXPORT2	IMPORT2
GDP(-1)	0.708394	1.030272	69.17021	31.64762
	(0.23392)	(5.28354)	(94.5739)	(75.7802)
	(3.02834)	(0.19500)	(0.73139)	(0.41762)
GDP(-2)	-0.572848	4.003635	-111.1411	-73.59584
	(0.21904)	(4.94750)	(88.5589)	(70.9606)
	(-2.61521)	(0.80922)	(-1.25500)	(-1.03714)
FDI1(-1)	-0.011755	0.392892	7.352237	4.991906
	(0.01040)	(0.23500)	(4.20638)	(3.37049)
	(-1.12987)	(1.67190)	(1.74788)	(1.48106)
FDI1(-2)	-0.007093	0.206281	1.646460	1.611035
	(0.00995)	(0.22474)	(4.02283)	(3.22342)
	(-0.71287)	(0.91785)	(0.40928)	(0.49979)
EXPORT2(-1)	-0.000809	0.122902	0.254910	0.113119
	(0.00249)	(0.05619)	(1.00577)	(0.80590)
	(-0.32519)	(2.18730)	(0.25345)	(0.14036)
EXPORT2(-2)	0.001324	0.058872	1.227307	0.787119
	(0.00325)	(0.07334)	(1.31281)	(1.05193)
	(0.40765)	(0.80269)	(0.93487)	(0.74826)
IMPORT2(-1)	0.002671	-0.176750	-1.906056	-1.708812
	(0.00319)	(0.07204)	(1.28945)	(1.03321)
	(0.83747)	(-2.45358)	(-1.47819)	(-1.65388)
IMPORT2(-2)	0.000531	-0.008331	1.402524	0.152340
	(0.00342)	(0.07719)	(1.38172)	(1.10715)
	(0.15549)	(-0.10792)	(1.01505)	(0.13760)
C	8.301797	-84.98864	1009.552	876.3770
	(2.20669)	(49.8421)	(892.160)	(714.870)
	(3.76210)	(-1.70516)	(1.13158)	(1.22592)
X11	0.001476	-0.443438	3.984511	2.606598
	(0.00907)	(0.20488)	(3.66721)	(2.93846)
	(0.16277)	(-2.16443)	(1.08652)	(0.88706)
X22	-0.042124	4.272454	27.84712	21.91667
	(0.04921)	(1.11157)	(19.8967)	(15.9429)
	(-0.85594)	(3.84363)	(1.39958)	(1.37470)

X32	-7.00E-05	-0.002472	-0.054580	-0.031532
	(7.1E-05)	(0.00160)	(0.02869)	(0.02299)
	(-0.98650)	(-1.54238)	(-1.90217)	(-1.37146)
X42	-2.08E-05	0.001897	-0.023261	-0.014401
	(6.2E-05)	(0.00139)	(0.02490)	(0.01996)
	(-0.33809)	(1.36348)	(-0.93402)	(-0.72163)
X52	-3.73E-06	-0.012436	-0.140334	-0.067484
	(0.00018)	(0.00407)	(0.07279)	(0.05832)
	(-0.02072)	(-3.05819)	(-1.92803)	(-1.15709)
R-squared	0.691310	0.700806	0.818142	0.819187
Adj. R-squared	0.382620	0.401612	0.636283	0.638373
Sum sq. resids	63.67225	32483.15	10407608	6682211.
S.E. equation	2.213112	49.98704	894.7543	716.9493
F-statistic	2.239498	2.342314	4.498783	4.530567
Log likelihood	-49.89315	-134.0620	-211.9512	-205.9695
Akaike AIC	4.732826	10.96755	16.73712	16.29404
Schwarz SC	5.404741	11.63947	17.40904	16.96595
Mean dependent	10.29963	-33.15037	139.3463	143.7833
S.D. dependent	2.816613	64.61986	1483.618	1192.225
Determinant Residual Covariance		9.62E+12		
Log Likelihood		-556.8221		
Akaike Information Criteria		45.39423		
Schwarz Criteria		48.08189		

Note: x22, x32, x42, x52 means in second difference.

Endogenous: GDP, FDI , EXPORT, IMPORT, x1, x2,x3 , x4, x5

Exogenous: C

	GDP	FDI1	EXPORT2	IMPORT2	X11	X22	X32
GDP(-1)	0.434326	-1.850293	-20.51562	-57.64994	-3.697708	-1.614122	1482.491
	(0.36337)	(9.16646)	(52.1387)	(44.7312)	(6.74142)	(1.73250)	(1457.52)
	(1.19526)	(-0.20185)	(-0.39348)	(-1.28881)	(-0.54851)	(-0.93167)	(1.01713)
GDP(-2)	-0.584287	10.56623	-9.193028	24.11004	-3.505981	1.511364	-2238.817
	(0.29659)	(7.48180)	(42.5563)	(36.5103)	(5.50245)	(1.41409)	(1189.65)
	(-1.97001)	(1.41226)	(-0.21602)	(0.66036)	(-0.63717)	(1.06879)	(-1.88191)
FDI1(-1)	-0.009560	-0.268592	3.813802	0.600293	0.495644	-0.116069	53.23764
	(0.01854)	(0.46775)	(2.66053)	(2.28254)	(0.34400)	(0.08841)	(74.3744)
	(-0.51560)	(-0.57423)	(1.43348)	(0.26299)	(1.44082)	(-1.31291)	(0.71581)
FDI1(-2)	-0.024179	0.690934	-2.471827	-1.657507	-0.989338	0.059808	34.13787
	(0.02002)	(0.50491)	(2.87194)	(2.46391)	(0.37134)	(0.09543)	(80.2844)
	(-1.20802)	(1.36842)	(-0.86068)	(-0.67271)	(-2.66427)	(0.62671)	(0.42521)
EXPORT2(-1)	-0.005520	0.055063	0.012760	-0.140554	0.052810	-0.008404	40.47814
	(0.00315)	(0.07947)	(0.45202)	(0.38780)	(0.05844)	(0.01502)	(12.6361)
	(-1.75216)	(0.69288)	(0.02823)	(-0.36244)	(0.90358)	(-0.55950)	(3.20338)
EXPORT2(-2)	-0.007490	0.320703	0.173745	0.014407	-0.099140	0.037312	38.89521
	(0.00615)	(0.15510)	(0.88218)	(0.75685)	(0.11406)	(0.02931)	(24.6612)
	(-1.21817)	(2.06777)	(0.19695)	(0.01904)	(-0.86916)	(1.27284)	(1.57718)
IMPORT2(-1)	0.005195	-0.119408	-1.946847	-1.371034	-0.248275	0.005131	-51.98287
	(0.00443)	(0.11181)	(0.63596)	(0.54560)	(0.08223)	(0.02113)	(17.7780)
	(1.17215)	(-1.06798)	(-3.06129)	(-2.51287)	(-3.01935)	(0.24281)	(-2.92400)
IMPORT2(-2)	0.003970	-0.281148	0.280414	0.125665	-0.063111	-0.040087	-38.10788
	(0.00683)	(0.17229)	(0.97997)	(0.84074)	(0.12671)	(0.03256)	(27.3948)
	(0.58127)	(-1.63185)	(0.28615)	(0.14947)	(-0.49808)	(-1.23105)	(-1.39106)
X11(-1)	0.023850	-1.022277	-2.567465	-3.535021	1.335293	-0.155563	-4.890741
	(0.02066)	(0.52119)	(2.96450)	(2.54333)	(0.38330)	(0.09851)	(82.8719)
	(1.15437)	(-1.96144)	(-0.86607)	(-1.38992)	(3.48364)	(-1.57922)	(-0.05902)
X11(-2)	-0.034708	0.679789	1.980122	0.917677	-1.170200	0.099217	56.37472
	(0.02700)	(0.68107)	(3.87393)	(3.32355)	(0.50089)	(0.12873)	(108.295)
	(-1.28553)	(0.99812)	(0.51114)	(0.27611)	(-2.33624)	(0.77076)	(0.52057)
X22(-1)	-0.070552	4.128460	6.451869	11.60415	0.676946	0.667480	420.8433
	(0.08630)	(2.17690)	(12.3822)	(10.6230)	(1.60099)	(0.41144)	(346.141)
	(-0.81756)	(1.89648)	(0.52106)	(1.09236)	(0.42283)	(1.62229)	(1.21581)
X22(-2)	0.049218	-0.468550	2.977953	-5.317367	4.110660	-0.376035	138.5309
	(0.07159)	(1.80589)	(10.2719)	(8.81253)	(1.32813)	(0.34132)	(287.148)
	(0.68750)	(-0.25946)	(0.28991)	(-0.60339)	(3.09507)	(-1.10171)	(0.48244)

X32(-1)	9.21E-05	-0.003005	0.022412	0.007597	-0.003845	-0.001251	-0.384431
	(0.00010)	(0.00260)	(0.01480)	(0.01270)	(0.00191)	(0.00049)	(0.41377)
	(0.89241)	(-1.15465)	(1.51417)	(0.59824)	(-2.00924)	(-2.54270)	(-0.92909)
X32(-2)	0.000136	-0.002705	0.008306	0.005632	0.003262	-0.000114	-0.036207
	(0.00012)	(0.00297)	(0.01688)	(0.01448)	(0.00218)	(0.00056)	(0.47186)
	(1.15872)	(-0.91152)	(0.49210)	(0.38894)	(1.49443)	(-0.20321)	(-0.07673)
X42(-1)	-5.14E-05	0.003803	-0.010910	-0.002835	-0.005285	0.000386	-0.418304
	(8.6E-05)	(0.00218)	(0.01240)	(0.01064)	(0.00160)	(0.00041)	(0.34669)
	(-0.59497)	(1.74425)	(-0.87974)	(-0.26643)	(-3.29595)	(0.93569)	(-1.20656)
X42(-2)	0.000114	-0.002135	-0.004171	0.009319	0.002216	-0.000228	-0.273090
	(9.0E-05)	(0.00227)	(0.01289)	(0.01106)	(0.00167)	(0.00043)	(0.36045)
	(1.26704)	(-0.94172)	(-0.32349)	(0.84246)	(1.32939)	(-0.53098)	(-0.75763)
X52(-1)	0.000233	-0.019283	-0.113376	-0.112228	-0.002565	-0.003869	0.938311
	(0.00028)	(0.00718)	(0.04087)	(0.03506)	(0.00528)	(0.00136)	(1.14240)
	(0.81949)	(-2.68396)	(-2.77436)	(-3.20103)	(-0.48544)	(-2.84911)	(0.82135)
X52(-2)	-0.000515	0.001653	0.082925	0.042054	-0.005788	-0.000622	1.524523
	(0.00049)	(0.01234)	(0.07018)	(0.06021)	(0.00907)	(0.00233)	(1.96198)
	(-1.05292)	(0.13396)	(1.18153)	(0.69842)	(-0.63784)	(-0.26667)	(0.77703)
C	10.41902	-120.2258	385.0848	312.7956	41.82980	1.646200	11448.86
	(3.46064)	(87.2979)	(496.549)	(426.003)	(64.2027)	(16.4996)	(13880.9)
	(3.01072)	(-1.37719)	(0.77552)	(0.73426)	(0.65153)	(0.09977)	(0.82479)
R-squared	0.743015	0.689312	0.980931	0.978265	0.914419	0.758371	0.729735
Adj. R-squared	0.164799	-0.009737	0.938026	0.929362	0.721862	0.214706	0.121639
Sum sq. resids	53.00730	33731.08	1091305.	803244.1	18244.40	1204.957	8.53E+08
S.E. equation	2.574085	64.93370	369.3415	316.8683	47.75510	12.27272	10324.86
F-statistic	1.285012	0.986071	22.86269	20.00398	4.748813	1.394923	1.200032
Log likelihood	-47.41834	-134.5709	-181.5065	-177.3691	-126.2743	-89.58923	-271.4324
Akaike AIC	4.919877	11.37562	14.85233	14.54586	10.76106	8.043646	21.51351
Schwarz SC	5.831762	12.28751	15.76422	15.45775	11.67295	8.955532	22.42539
Mean dependent	10.29963	-33.15037	139.3463	143.7833	-58.88889	0.544444	440.2963
S.D. dependent	2.816613	64.61986	1483.618	1192.225	90.55017	13.84920	11016.60
Determinant Residual Covariance		0.000000					